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A New Look at the Braden Scale for Pressure Ulcer Risk among Older Adults in Home Health Care

Kelly, C Bergquist-Beringer, S

Breastfeeding Experiences of Mothers Using Telehealth at One and Four Weeks Postpartum

Curtis Neely, M Wambach, K

Developing a Center for Nursing Scholarship and Leadership in Kansas

Pendley, A Teel, C

Magnet Status: Implications for Quality of Patient Care

Scott, K Dunton, N

A NEW LOOK AT THE BRADEN SCALE FOR
PRESSURE ULCER RISK AMONG OLDER
ADULTS IN HOME HEALTH CARE

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Submitted to the School of Nursing in partial fulfillment of the
requirements for the Nursing Honors Program

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ABSTRACT

Only two previous studies have examined Braden Scale use in home health care. Findings are mixed and suggest the Braden Scale is not a reliable tool for identifying elder home health care patients who are at risk for pressure ulcer development. However, each previous study was limited to one home health care agency and no subsequent study has been conducted to clarify these results. The purpose of this study was to reexamine the validity of the Braden Scale in a large sample of elder home health care patients from multiple (N=5) agencies across the United States. The Conceptual Schema for the Study of the Etiology of Pressure Sores guided the research study. Secondary analysis of data from a retrospective cohort study was performed. The sample included 2120 patients age 60 years and older who were admitted for intermittent skilled home health care and had a documented admission Braden Scale score. New pressure ulcer development (n=30) was determined from OASIS (Outcome and Assessment Information Set) data completed after patient admission. Statistical analyses included a description of the sample and new pressure ulcers by stage. Specificity, sensitivity, predictive value positive, and predictive value negative values across the range of Braden Scale scores were calculated for the total sample (n=2120) and a subset of patients who were pressure ulcer free on admission (n=2111) to determine the optimal cutoff score for pressure ulcer risk. A Braden Scale score of 18 or less yielded the best balance between sensitivity (73.30%) and specificity (65.50%) for the total sample and for the subset of patients who were pressure ulcer free on admission (sensitivity = 71.43; specificity = 65.60). Receiver-Operator Characteristic curve analyses confirmed the cutoff score for both groups. The area under the curve was 0.76 for the total sample (95% CI=0.66-0.85) and 0.73 for patients who were pressure ulcer free on admission (95% CI=0.62-0.84). Results will guide home health care provider use of the Braden Scale for identifying elder patients at risk for pressure ulcer development.

INTRODUCTION

Pressure ulcers are defined by the National Pressure Ulcer Advisory Panel (2010) as localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear. The development of a pressure ulcer is especially problematic in elderly people due in part to a reduction in collagen associated with aging, reduced tissue perfusion, compromised nutritional intake, lack of mobility and incontinence (Braden & Bergstrom 1989). The costs both personally and medically are high. The presence of a pressure ulcer has been reported to increase the risk of death four-fold in elderly patients (Braden & Bergstrom, 1996); some estimates of mortality for persons who develop pressure ulcers are as high as 60%. Additionally, the annual financial burden this places on the health care system is estimated to be about \$11 billion (Zulkowski, Langemo, Posthauser and the National Pressure Ulcer Advisory Panel, 2005). Preventing pressure ulcers is key to reducing their incidence and the associated negative sequelae. The first step in preventing pressure ulcers is identifying the persons at risk for acquiring them. Appropriate interventions can then be directed to at-risk persons to prevent the formation of the ulcers (Bergquist, 2001).

Most organizations utilize an assessment tool to identify those patients at risk for pressure ulcers. The Braden Scale is one of the most commonly used tools to assess pressure ulcer risk in hospitalized and nursing home patients. While many studies have examined Braden Scale use in hospitalized and nursing home patients, only two previous studies have examined Braden Scale use in home health care. Findings from these two studies are mixed and suggest the Braden Scale is not a reliable tool for identifying elder home health care patients who are at risk for pressure ulcer development (Bergquist-Beringer, protocol 2007). However, each of the two previous studies was limited to one home health care agency and no subsequent study has been conducted to clarify

these results. This study will reexamine the validity of the Braden Scale in a large sample of elder home health care patients from multiple (N=5) agencies across the United States.

LITERATURE REVIEW

The Braden Scale was created by Barbara Braden, PhD, RN, FAAN, and Nancy Bergstrom, PhD, RN, FAAN, in 1987 (Braden & Bergstrom, 1987). The Braden Scale has 6 subscales: sensory perception, moisture, activity, mobility, nutrition, and friction/shear. These categories address the two primary etiologic factors of pressure ulcer development: intensity and duration of pressure and tissue tolerance for pressure. Sensory perception, mobility, and activity address clinical situations that predispose a patient to intense and prolonged pressure, while moisture, nutrition, and friction/shear address clinical situation that alter tissue tolerance for pressure. Each of the subscales is ranked with a numerical score. Five of the subscales-sensory perception, mobility, activity, moisture, and nutrition-have scores that range from 1 to 4, with 1 representing the lowest score and 4 representing the highest. Friction/shear has a score that ranges from 1 to 3. Each of the 6 subscale scores are then totaled to give a final Braden Scale score. Scores can range from 6 to 23. As Braden Scale scores become lower, predicted risk becomes higher (Ayello & Braden, 2002).

It is necessary that any tool used to assess pressure ulcer risk be both valid and reliable. Validity refers to the ability of an instrument to accurately reflect or represent what it is intended to measure. Reliability refers to the capacity of a measuring device to produce “consistent” measures (Magnan & Maklebust, 2008). Choice of an optimal cut score for a screening tool should be influenced by the nature of the phenomena being predicted and should provide the lowest rate of misclassification while maintaining a sensitivity, specificity, and predictive value positive and negative tests acceptable for clinical decision making from both a practical and an ethical perspective (Braden & Bergstrom, 1994). Sensitivity indicates a tool’s accuracy in differentiating

true positives from false negatives; for the Braden Scale this is given as the percentage of people who develop pressure ulcers and were predicted to develop them. Specificity indicates a tool's accuracy in differentiating true negatives from false positives; in this case it is given as the percentage of people who do not develop pressure ulcers and were not predicted to develop them (Braden & Maklebust, 2005). Predictive value positive is defined as the probability that a person with a given Braden Scale score will actually develop a pressure ulcer. Predictive value negative is defined as the probability that a person with a given Braden Scale score will remain pressure ulcer free (Gerstman, 1998).

The majority of studies regarding pressure ulcer risk and development have concentrated on patients admitted to hospitals and nursing homes. Previous studies to validate the Braden Scale in the acute care setting have shown that a cut score of 16 resulted in the optimal prediction of pressure ulcer outcome (Braden & Bergstrom, 1994). The earliest of these studies was conducted in an adult intensive care unit (Bergstrom, Demuth & Braden, 1987). The purpose of this study was to describe the protocol by which predictive instruments can be tested for validity and to evaluate the use of the Braden Scale for predicting pressure ulcer risk in an adult intensive care unit. The sample size was 60 adults age 21 to 84 with a mean age of 58.53. The participants were pressure ulcer free upon admission. They were assessed for risk within 24 to 72 hours after admission. Comprehensive skin assessments were performed at the beginning of the study and every 48 hours for 2 weeks or until discharge. The study provided a basis for creating a clinical cut-off point with the greatest validity for adult intensive care units. The study identified that at a score of 16, the instrument was 83% sensitive and 64% specific.

In a later study among 102 residents in a skilled nursing facility, Bergstrom & Braden (1994) found that a cut score of 18 simultaneously maximized sensitivity (75% to 79%) and specificity (64% to 75%). The primary discernable difference between patients in this study and previously studied

hospitalized patients was that these patients were considerably older with a mean age of 75.9.

According to the authors, it is not unusual for predictive characteristics of screening tools to vary with the age of the population screened. While a score of 16 seems to be an appropriate predictor of mild risk for the stable adult patients, a score of 18 may be more appropriate for patients who are older, hemodynamically unstable, more severely ill, and have less access to individualized or attentive care (Braden & Bergstrom, 1996). The AHCPR (Agency for Health Care Policy and Research) Guideline stresses evaluation of the risk cut-off score within individual settings (Harrison et al, 1996).

Only two previous studies have examined Braden Scale use in home health care. In the first study, Ramundo (1995) examined the validity of the Braden Scale in a community-based, suburban home care agency. Ten nurses volunteered to serve as data collectors for the study. They were instructed in the use of the Braden Scale. An inter-rater reliability study was completed to ensure consistency in Braden Scale scoring and skin assessment among the data collectors. Specifically, nurses who finished the education program were asked to complete a Braden Scale and a skin assessment tool for any patient newly admitted to the agency. Within 24 to 48 hours, one of two certified ET (enterostomal) nurses employed at the agency completed a second Braden Scale and skin assessment tool. Three to four pairs of observations were obtained before a nurse was cleared to begin admitting patients to the study. The study sample included only home health care patients unable to leave the bed or chair. Data were collected for 48 patients. Seven of the patients acquired a pressure ulcer, yielding an incidence rate of 17%. Incidence is defined as the number of new pressure ulcers that develop in a given period. The Braden Scale pressure ulcer risk tool was 100% sensitive and 0% to 34% specific in identifying patients at risk when a cutoff score of 18 was used. The limitations of this study include the use of a convenience sample and the potential bias of data because the same nurse completed the Braden Scale and the skin assessment.

The second study was conducted by Bergquist & Franz (2001). The purpose of this study was to examine the validity of using the Braden Scale in evaluating older adults that were receiving home health care. Specifically, the study was a secondary analysis of a retrospective cohort study involving risk factors in older adults that predispose them to developing pressure ulcers. The study was conducted in a large Midwestern urban home health care agency. Hospice patients were excluded for the study as were patients who had a pressure ulcer upon admission for home health care. The sample size was large (n=1,696). All patients were evaluated using the Braden Scale by a registered nurse upon being admitted to the Intermittent Skilled Division of the home health agency. The development of the ulcer was primarily determined by the visiting nurse report and documentation on the agencies wound assessment report. Of the 1,696 patients, 108 acquired a pressure ulcer after admittance to the home health care agency. The incidence rate was 6.3%. The patients who developed a pressure ulcer were older and had more medical issues. Although there were more women in the study than men, men developed more ulcers. The average length of time for a pressure ulcer to develop was 56.9 days after admission. There was not a difference in the outcomes of patients based on the number of visits or the number of patient care days in respect to who developed an ulcer and who did not. The study found that an admission score of 19 or less identified individuals who were at-risk for developing a Stage I-IV pressure ulcer with 61% sensitivity, 68% specificity and 11% predictive value positive (PVP). The low sensitivity and PVP found in this study suggests that the Braden Scale may not be useful for identifying patients at risk for pressure ulcers among elder adults in home health care. Results provide the rationale for this study which aims to reexamine the validity of Braden Scale use in elder home care.

METHODS

Design, Setting, Subjects

This study is a secondary analysis of data from a retrospective cohort study. The parent study included 5395 patients who were 60 years and older and admitted for intermittent skilled home health care between October, 2007 and February, 2009. The cohort sample for the parent study was accrued from five Medicare certified home health care agencies located across the United States. Only the first admission was considered for patients with more than one admission during the study period. Outcome Assessment Information Set (OASIS) data on age, gender, ethnicity, race and other OASIS data relevant to pressure ulcer risk were extracted from the electronic medical record of eligible home patients (Bergquist-Beringer, protocol 2007). When available, data on Braden Scale scores were extracted.

The sample for the current study was restricted to patients with a documented admission Braden Scale score. Excluded from the sample were subjects who were admitted with a pressure ulcer and did not develop a new pressure ulcer. The total sample for the current study was 2120.

Variables

OASIS data items address sociodemographic, environmental, support system, health status, functional status and health service utilization characteristics of the patient (Ohio Department of Health, Ohio.gov, 2008). Home health care agencies collect OASIS data due to a federal mandate for prospective payment of services provided to Medicare/Medicaid patients and are completed at defined intervals (admission, after a significant change in patient condition ,and at discharge) during the patient's course of home health care (Bergquist-Beringer, protocol 2007). OASIS data are useful in home health care because the data is nationally uniform. It also has established reliability and validity, and it includes data on risk factors that have been shown to predict pressure ulcer development in elder home health care patients (Bergquist-Beringer, protocol 2007). Previous studies on the inter-rater reliability of OASIS data have found that reliability coefficients for the majority of OASIS items are substantial to excellent and that nurses and therapists rated the

majority of functional items accurately and provided similar ratings on most items studied (Bergquist-Beringer, protocol, 2007). Inter-rater reliability is the degree to which two raters, operating independently, assign the same rating or values for an attribute being measured or observed (Polit and Beck, 2004). In general, data collectors were able to differentiate between individuals with and without pressure ulcers (Kottner et al, 2009). OASIS data important to the current study also included age, gender, ethnicity, existing diseases by ICD9 code, living arrangements, identification of the primary caregiver and risk factors.

Information on the Braden Scale available in the parent study included the total Braden Scale score and subscales but the focus of this study is on the total scores. The inter-rater reliability studies of the Braden Scale have produced favorable results with percentages of agreement ranging from 95% to 100% (Kring, 2007). Kottner and colleagues examined the reliability of Braden Scale scores in home health care and reported that the interclass correlation for the Braden Scale sum scores was .88 to .90 for two measures performed in 2007 and 2008 (Kottner et al, 2009). The inter-rater reliability for determination of new pressure ulcer development for the current study was 95%.

Outcomes

Patient OASIS data were followed forward from admission to new pressure ulcer development or discharge. New pressure ulcer development was defined as patients with or without a pressure ulcer on admission who developed a new pressure ulcer on the recertification or discharge OASIS assessment (Bergquist-Beringer, protocol, 2007).

Data Analysis

Statistical analyses include a description of patient age, gender, ethnicity/race, Braden Scale scores and the stages of the new ulcers. The statistical analysis also included a descriptive analysis of

patient existing diseases by ICD9 code, living arrangements, identification of the primary caregiver and risk factors such as heavy smoking, obesity, alcohol dependency and drug dependency.

Specificity, sensitivity, predictive value positive and predictive value negative values across the range of Braden scale scores were calculated to determine the optimal cutoff score for pressure ulcer risk for the total sample (n=2120). An analysis also was conducted on a subset of patients who did not have a pressure ulcer on admission (n=2111) to determine whether or not patients who were admitted with a pressure ulcer may have influenced Braden Scale validity parameters. Additionally, Receiver-Operator Characteristic (ROC) curve analyses were completed to confirm the appropriate cutoff score for both groups (Figure 1 and 2).

RESULTS

The total sample had ages ranging from 60 to 100 years. The mean age was 77.5 SD \pm 8.803. See Table 1 for a description of the sample. Most of the patients in the study were white n = 1917 (90.4%) and female n = 1314 (62%).

Table 1 Demographic Characteristics of the Sample (n=2120)

Characteristic	Total Patients in Sample
Age, mean \pm SD	77.53 \pm 8.803
Gender, n (%)	
Female	1314 (62.0)
Male	806 (38.0)
Ethnicity, n (%)	
American Indian or Alaskan Native	9 (0.4)
Asian	39 (1.80)
Black or African American	126 (5.90)
Hispanic or Latino	20 (0.9)
Native Hawaiian or Pacific Islander	1 (0.0)
White	1917 (90.40)
Other	15 (0.7)

The majority of the patients in this study had hypertension n = 1142 (53.9%). (See Table 2) Heart disease and diabetes also were highly prevalent in these older adults. The primary caregiver was often the spouse n = 739 (34.9%) or son /daughter n = 776 (36.6%). Many patients lived with their spouse or significant other n = 895 (42.2%) and owned or rented their residence n = 1660 (78.3%). Few patients smoked n = 113 (5.3%) or claimed alcohol or drug dependency. Approximately 15% of the patients were obese.

Table 2 Additional Characteristics of the Sample (n=2120)

Other Characteristics	Total Patients in Sample
Baseline comorbid conditions (ICD-9-CM category), n (%)	
Infectious disease (001-139.0)	69 (3.30)
Neoplasms (140-239.0)	177 (8.30)
Diabetes (250-250.9)	568 (26.80)
Anemia (280-285.9)	210 (9.90)
Mental disorders (290-319.0)	364 (17.20)
Degenerative diseases of the nervous system and paralysis (331-344.9)	197 (9.30)
Hypertension (401-405.9)	1142 (53.90)
Heart disease (410-429.9)	845 (39.90)
Stroke (430-439.9)	176 (8.30)
Peripheral arterial disease (440-448.9)	98 (4.60)
COPD (490-496.9)	380 (17.90)
Genitourinary system diseases (580-629.9)	271 (12.80)
Musculoskeletal and connective tissue disease (710-739.9)	997 (47.0)
Who patient lives with, n (%)	
Lives alone	621 (29.30)
With spouse or significant other	895 (42.20)
With other family member	534 (25.20)
With a friend	26 (1.20)
With paid help (other than home care agency staff)	141 (6.70)
With other than above	19 (0.9)
Current residence, n (%)	
Patient's owned or rented residence (house, apartment, or mobile home owned or rented by patient/couple/significant other)	1660 (78.30)
Family member's residence	285 (13.40)
Boarding home or rented room	9 (0.4)
Board and care or assisted living facility	154 (7.30)
Other	11 (0.50)
Primary caregiver, n (%)	
No one person	188 (8.90)
Spouse or significant other	739 (34.90)
Daughter or son	776 (36.60)
Other family member	144 (6.80)
Friend or neighbor or community or church member	71 (3.30)
Paid help	165 (7.80)
Missing information	37 (1.70)
Risk factors, n (%)	
Heavy smoking	113 (5.30)
Obesity	315 (14.90)
Alcohol dependency	34 (1.60)
Drug dependency	5 (0.20)
None of the above	1651 (77.90)
Unknown	29 (1.40)

Of the 2120 patients, 30 patients (1.4%) developed a new pressure ulcer. The stages of the pressure ulcers developed in this sample are as follows: Stage I = 9 (0.4%), II= 13 (0.6%), III = 4 (0.2%), IV = 2 (0.1%) and V = 2 (0.1%).

The reported Braden Scale scores within the sample ranged from 9 to 23. Approximately one third (35%) of the total sample had a Braden Scale score of 18 or less. The remaining 65% of the sample had a score of 19 and greater.

Sensitivity, specificity, PVP and PVN for the total sample was calculated by Braden Scale Score. (See Table 3) The optimal cutoff score for these patients was 18. For a cut off score of 18, the sensitivity was 73.30% and the specificity was 65.50%. The percentage of patients that were correctly classified was 65.61%. A ROC curve for this group was also calculated. (See Figure 1)

Table 3 Sensitivity, specificity, Predictive Value Positive (PVP) and Predictive Value Negative (PVN) of Braden Scale by score for all patients in the study (n=2120)

BS Score*	Incidence	Sensitivity	Specificity	PVP%	PVN%
9	1	3.33	99.95	50.00	98.63
10	2	6.66	99.90	50.00	98.68
11	2	6.66	99.76	28.57	98.67
12	4	13.33	99.52	28.57	98.77
13	4	16.66	99.04	20.00	98.81
14	7	23.33	97.66	12.50	98.89
15	7	23.33	95.60	7.00	98.86
16	11	36.66	91.20	5.64	99.00
17	16	53.33	82.30	4.14	99.19
18	22	73.30	65.50	3.00	99.40
19	25	83.33	47.37	2.22	99.50
20	29	96.66	26.50	1.85	99.82
21	29	96.66	11.77	1.55	99.60
22	29	96.66	2.68	1.40	98.25
23	30	100.00	0.00	0.00	0.00

BS = Braden Scale

*Patients whose Braden Scale score was less than or equal to the stated number in column

The area under the curve represents those patients with a cutoff score of 18. The area is 0.755 with a standard error of 0.046. The lower boundary is 0.664 and the upper boundary is 0.845 at a 95% Confidence Interval.

An analysis was conducted on the subset of patients who did not have a pressure ulcer on admission (n=2111) to determine whether or not patients who were admitted with a pressure ulcer may have influenced Braden Scale validity parameters (See Table 4). The optimal cutoff score for these patients was also 18. For a cut off score of 18 the sensitivity was 71.43% and the specificity was 65.50%. The percentage of the patients that were correctly classified was 65.56%. A ROC curve for this group was also calculated (See Figure 2).

Table 4 Sensitivity, specificity, Predictive Value Positive and Predictive Value Negative of Braden Scale by score for the subset of patients who did not have a pressure ulcer upon admission (n=2111)

BS Score*	Incidence	Sensitivity%	Specificity%	PVP%	PVN%
9	1	4.76	99.95	50.00	99.05
10	2	9.50	99.90	50.00	99.10
11	2	9.50	99.76	28.57	99.10
12	2	9.50	99.52	9.10	99.09
13	3	14.29	99.04	13.04	99.14
14	4	19.00	97.66	7.50	99.17
15	4	19.05	95.6	4.20	99.16
16	6	28.57	91.19	3.16	99.22
17	10	47.62	82.30	2.63	99.36
18	15	71.43	65.50	2.03	99.56
19	17	80.95	47.37	1.52	99.6
20	20	95.24	26.46	1.28	99.82
21	20	95.24	11.77	1.07	99.60
22	20	95.24	2.68	0.97	98.25
23	21	100.00	0.00	0.00	0.00

BS = Braden Scale

*Patients whose Braden Scale score was less than or equal to the stated number in column

Figure1 Receiver Operator Characteristic (n=2120)

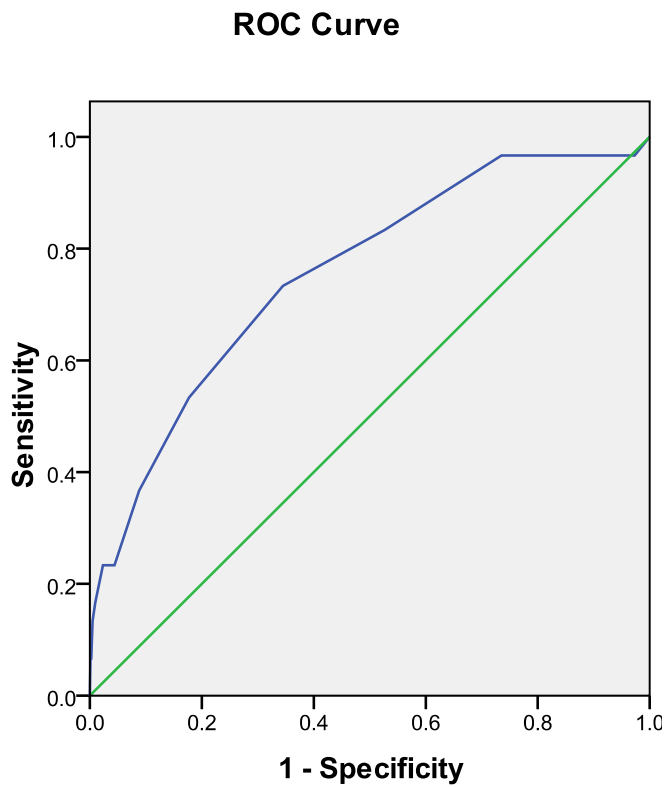
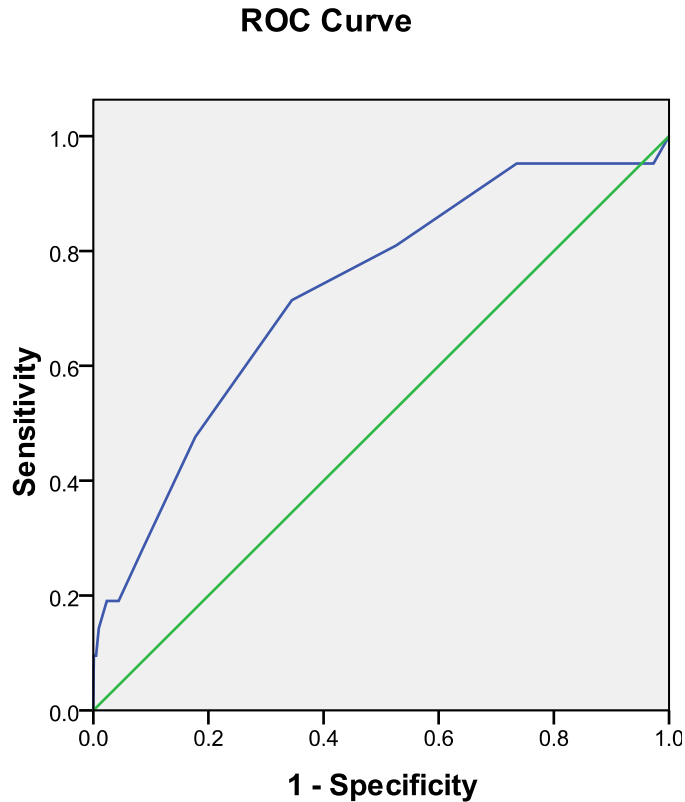


Figure 2 Receiver Operator Characteristic (n=2111)



The area under the curve represents those patients with a cutoff score of 18. The area is 0.727 with a standard error of 0.057. The lower boundary is 0.615 and the upper boundary is 0.839 at a 95% Confidence Interval.

DISCUSSION

This study found that a Braden Scale score of 18 or less yielded the best balance between sensitivity 73.30% and 71.43% and specificity 65.50% and 65.50% for pressure ulcers among the patient sample that included pressure ulcers on admission and among the sample of patients that were pressure ulcer free on admission respectively. The cutoff score validity does not differ significantly between the two groups in this study; therefore, having an existing pressure ulcer did not modify

the performance of the Braden Scale in this patient population. This study shows a cutoff score of 18 or less is the best indicator of pressure ulcer risk in elder home health care patients.

Results from the current study are more favorable than those by Bergquist and Frantz (2001) which found 61% sensitivity and 68% specificity with a cut off score of 19 or less. These results are less favorable than those reported by Ramundo (1995) which revealed a sensitivity of 100% and a specificity of 0% to 34% at a cutoff score of 18. While the sensitivity percentage is good, every patient in the study was indentified at risk because they were confined to a chair or bed. Therefore, that study was not a particularly strong study when trying to measure the validity of the Braden Scale. The sensitivity and specificity percentages were somewhat similar to those found in hospitalized and nursing home patients. The Bergstrom et al. study in 1987, conducted in an adult intensive care unit had a sensitivity of 83% and a specificity of 64% with a cut off score of 16. The Bergstrom & Braden study in 1994, conducted in a skilled nursing facility found that a cut score of 18 simultaneously maximized sensitivity (75% to 79%) and specificity (64% to 75%). This study provided the rationale for the current study which took a new look at the validity of the Braden Scale in elder home health care patients. While the Braden Scale score is helpful in determining some patients at risk, it is not inclusive of all patients. The PVP found in this study was only 3.0%

Limitations

In this study, only 2120 out of the original 5395 patients admitted to the parent study had a documented Braden Scale Score which limits the generalizability of this study to a greater population. Additionally, the number of new ulcers in the sample of patients who were pressure ulcer free on admission was only 21.

CONCLUSION

Identification of pressure ulcer risk is important to reducing their occurrence and avoiding the high cost of caring for patients with pressure ulcers and the patient's own health and well being. This study found that the Braden Scale reasonably identified patients at pressure ulcer risk but did not predict their occurrence. Further studies are needed to guide home health care provider use of the Braden Scale for identifying elder patients at risk for pressure ulcer development in home health care and to determine whether there are additional criteria that need to be evaluated to determine risk factors prevalent in the elder home health care patient.

REFERENCES

- Ayello, E. A., & Braden, B. (2002). How and why to do pressure ulcer risk assessment. *Advances in Skin & Wound Care*, 15, 125-131.
- Bergquist-Beringer, S. (2007). A computerized decision support system to translate pressure ulcer prediction and prevention to home health care. Protocol.
- Bergquist, S. (2001). Subscales, subscores, or summative score: evaluating the contribution of Braden Scale items for predicting pressure ulcer risk in older adults receiving home health care. *Journal of Wound, Ostomy and Continence Nursing*, 28, 279-289.
- Bergquist, S., & Frantz, R. (2001). Braden Scale: Validity in community-based older adults receiving home health care. *Applied Nursing Research*, 14(1), 36-43.
- Bergstrom, N., Demuth, P. J., & Braden, B. (1987). A clinical trial for the Braden Scale for predicting pressure sore risk. *Nursing Clinics of North America*, 22(2), 417-418.
- Braden, B., & Bergstrom, N. (1994). Predictive validity of the Braden Scale for pressure sore risk in a nursing home population. *Research in Nursing & Health*, 17, 459-470.

Braden, B., & Bergstrom, N. (1996). Risk assessment and risk-based programs of prevention in various settings. *Ostomy/Wound Management*, 42(10A-Suppl), 6S-12S.

Braden, B. J., & Bergstrom, N. (1989). Clinical utility of the Braden Scale for predicting pressure sore risk. *Decubitus*, 2(3), 44-51.

Braden, B. J., & Maklebust, J. (2005). Preventing pressure ulcers with the Braden Scale. *American Journal of Nursing*, 105(6), 70-72.

European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel. Prevention and treatment of pressure ulcers: quick reference guide. Washington DC: National Pressure Ulcer Advisory Panel; 2009. Retrieved on February 9, 2010 from http://www.npuap.org/Final_Quick_Prevention_for_web_2010.pdf.

Gerstman, B. B. (1998). Epidemiology kept simple: An introduction to classic and modern epidemiology. *Wiley-Liss*, New York, Chichester, Weinheim, Brisbane, Singapore & Toronto, 54-69.

Harrison, M. B., Wells, G., Fisher, A., & Prince, M. (1996). Practice guidelines for the prediction and prevention of pressure ulcers: Evaluating the evidence. *Applied Nursing Research*, 9, 9-17.

Kottner, J., Halfens, R., & Dassen, T. (2009), An interrater reliability study of the assessment of pressure ulcer risk using the Braden scale and the classification of pressure ulcers in a home care setting. *International Journal of Nursing Studies*, 46, 1307-1312.

Kring, D. L. (2007). Reliability and validity of the Braden Scale for predicting pressure ulcer risk. *Journal of Wound, Ostomy, & Continence Nursing*, 34(4), 339-406.

Magnan, M. A., & Maklebust, J. (2009). The effect of web-based Braden scale training on the reliability of Braden subscale ratings. *Journal of Wound Ostomy and Continence Nursing*, 36(1), 51-59.

Ohio Department of Health, Bureau of Information and Operational Support. Outcome and information set. 2008. Retrieved on March 16, 2010 from <http://www.odh.ohio.gov/odhPrograms/hcf/oasis/oasis1.aspx>

Polit, D. F., & Beck, C. T. (2004). Nursing research: Principles and methods, seventh ed. *Lippincott Williams & Wilkins*, Philadelphia.

Ramundo, J. M. (1995). Reliability and validity of the Braden Scale in the home care setting. *Journal of Wound, Ostomy, & Continence Nursing*, 22, 128-134.

Zulkowski, K., Langemo, D., Posthauer, M.E., & the National Pressure Ulcer Advisory Panel. (2005). Coming to consensus on deep tissue injury. *Advances in Skin & Wound Care*, 18(1), 28-29.

BREASTFEEDING EXPERIENCES OF MOTHERS
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ABSTRACT

Research demonstrates that breastfeeding provides many health benefits for both mothers and infants. However, many mothers stop breastfeeding in the early postpartum period due to problems such as sore nipples, engorgement, mastitis, and insufficient milk supply. Lactation support is associated with increased breastfeeding duration. However, in underserved rural and urban areas some mothers lack access to lactation support. Telehealth technology has not been used to address this problem in the U.S., but may be an alternative means to provide mothers with lactation support. The purpose of the parent study was to evaluate the feasibility and reliability of telehealth methods for assessing and providing lactation support in women's homes over the first four weeks after birth. The purpose of this ancillary study was to identify the breastfeeding experiences of mothers at one and four weeks postpartum, and to determine if telehealth enhanced breastfeeding support. Seven mother-baby dyads were recruited from the maternity unit of a 600 bed Midwestern university-affiliated hospital and a free standing birthing center. Data were collected using videoconferencing and face to face home visits to compute LATCH breastfeeding assessment scores. *The Breastfeeding Experience Scale* (BES) was administered via the telephone at one and four weeks postpartum. Data analyses included descriptive statistics and narrative analysis. At one week, the most frequent experiences of mothers were feeling tired/fatigued, (85.8%), followed by baby's reluctance to nurse due to sleepiness (85.7%), and sore nipples (85.7%). On a 5-point scale, the most severe experiences were sore nipples (moderate, 3) and engorgement (mild, 2). At week four, the most frequent experiences were mothers feeling tired/fatigued (85.8%), mothers feeling tense and overwhelmed (85.8%), and baby's reluctance to nurse due to fussiness (71.5%). The most severe experiences were feeling tired/fatigued (moderate, 3), sore nipples, baby's reluctance to nurse due to sleepiness and fussiness, leaking breasts, and feeling tense and overwhelmed (mild, 2). The majority of mothers (n=6) reported they had an improved breastfeeding experience and that they had a decrease in breastfeeding problems

because of their telehealth experience. At four weeks, 5 were exclusively breastfeeding. In conclusion, telehealth may be an important tool in breastfeeding assessment and support and more research in this area is needed.

INTRODUCTION

Breast feeding has been designated as a national health priority by the Healthy People 2010 Objectives. The American Academy of Pediatrics (2005) reports that 70% of all United States women initiate breastfeeding, but only 33% continue to breastfeed at 6 months, and only 18% of mothers breastfeed at 1 year. The current rates fall short of the Healthy People 2010 objectives which aim to increase the number of women initiating breastfeeding to 75%, 50% of women breastfeeding 6 months post partum, and 25% of women breastfeeding at 1 year (American Academy of Pediatrics, 2005). While the number of women who initiate breastfeeding is much closer to the Healthy People 2010 goal, the number of women still breastfeeding at 6 months and exclusively breastfeeding is much further behind (American Academy of Pediatrics, 2005; Forste & Hoffmann, 2008).

According to the American Academy of Pediatrics (2005), human milk is considered the best source of nutrition and maternal antibodies for infant development. Infants who are breast fed have a lower incidence and decreased severity of infectious diseases such as diarrhea, bacteremia, bacterial meningitis, respiratory tract infection, urinary tract infection, atopic dermatitis, gastrointestinal infections, asthma, and otitis media (American Academy of Pediatrics, 2005; Ip et al., 2007). Furthermore, Ip et al. (2007) reported that “there is an association between a history of breastfeeding and a reduction in the risk of being overweight or obese in adolescence and adult life” (p.4). Additionally the American Academy of Pediatrics (2005) reports that breast fed infants have a 20% reduction in mortality as compared to non breast fed post neonatal infants. While breastfed infants receive balanced nutrition and may experience less illness and death, mothers who breastfeed also experience health benefits. Breastfeeding reduces the incidence of post partum hemorrhage because it allows the uterus to contract and decrease in size more rapidly (American Academy of Pediatrics, 2005). Over time breastfeeding also promotes maternal weight loss and

contraception. Ip et al.'s (2007) meta analysis reported that breastfeeding has also been associated with decreased the risk of breast and ovarian cancer, postpartum depression, and maternal Type 2 Diabetes. Post menopausal women who have breast fed also have a decreased risk of osteoporosis and hip fractures (American Academy of Pediatrics, 2005). The strong evidence base supporting breastfeeding has led the American Academy of Pediatrics (2005) to recommend that women exclusively breastfeed their infants for the first 6 months of life and to continue to breastfeed for the first year.

Because human milk is recognized as the optimal source of nutrition for infants and data suggest that not enough U.S. women are meeting the goals for initiation and duration of breastfeeding, it is important to examine this problem. Research demonstrates that women who receive professional support by lactation consultants have higher rates of breastfeeding initiation and duration (Bonuck, Trombley, Freeman, & McKee, 2006). Additionally, researchers suggest that breastfeeding support early in the postpartum period is more strongly associated with increased duration and exclusivity of breastfeeding (Wambach et al., 2005). Together these studies suggest that providing post partum women with access to lactation consultants after they are discharged from the hospital could promote initiation and longer duration of breastfeeding. Research also shows that many women in underserved rural areas lack access to lactation support (Flower, Willoughby, Cadigan, Perrin, & Randolph, 2008). In order to connect post partum women with lactation consultants, this study examined the use of telehealth. "Telehealth is the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health and health administration" (U.S. HRSA, 2009).

The purpose of the parent study was to evaluate the feasibility and reliability of telehealth methods for assessing and providing lactation support in women's homes during the first 4 weeks after birth. The purpose of this ancillary study was to identify the breastfeeding experiences and/or

problems of mothers at 1 and 4 weeks postpartum, and to determine if telehealth enhanced breastfeeding support.

Research Questions for Parent Study

1. Can techniques used in assessing breastfeeding (mother-infant positioning, attachment, suckling, latching, swallowing) be reliably observed over videoconferencing technology?
2. Can videoconferencing technology be used to provide consultation or teaching using educational materials and audio/videotapes?
3. What are women's experiences in receiving breastfeeding support over real-time videoconferencing?

Research Questions for Ancillary Study

4. What are the breastfeeding experiences and problems of mothers at 1 and 4 weeks postpartum?
5. Do mothers think they had an improved breastfeeding experience or a decrease in breastfeeding problems because of their telehealth experience?

LITERATURE REVIEW

The purpose of the current study was to assess both the feasibility and reliability of using telehealth for assessing and supporting breastfeeding in post partum women. Furthermore this study identified the breastfeeding experiences and problems of mothers at 1 and 4 weeks post partum. The literature reviewed for this investigation focused on the use of telehealth and breastfeeding, the use of certified lactation consultants in the home, the early experiences of breastfeeding mothers, and frequently reported problems and concerns of breastfeeding mothers.

While no U.S. study has examined the use of telehealth for assessing and supporting breastfeeding, outside the U.S., researchers Lindberg and Christensson (2007) found videoconferencing between midwives and parents of newborns to be helpful in postpartum care. Lindberg and Christensson piloted a 1 year study to provide support for parents after their hospital discharge. These researchers found that during 23 videoconferences that 7 midwives were able to effectively support 9 couples/new parents. Their results concluded that 87% of participants most frequently sought advice for breastfeeding and overall the equipment was “easy to handle and useful for making assessments” and “almost like a real-life encounter” (Lindberg & Christensson, 2007, p.202). The lack of research utilizing telehealth with breastfeeding support demonstrates the importance for more research in this area to determine if it is feasible and reliable.

While there were few studies outside of the U.S. examining the use of telehealth for breastfeeding support, McKeever et al. (2002) have found that “in-home lactation support appears to facilitate positive breastfeeding outcomes for mothers of term newborns” (p.258). McKeever et al. (2002) examined 101 mothers out of 156 eligible mothers of term newborns in their randomized controlled trial comparing home versus hospital breastfeeding support for newborns. These researchers randomly assigned mothers to two separate groups: experimental (n=53) and standard care (n=48). The experimental group received standard hospital care with early discharge and home support from certified lactation consultant nurses. The standard care group received standard care and standard length of hospitalization. Overall, there were significant differences found between groups in relation to exclusive breastfeeding rates. More newborns were exclusively breastfed in the experimental group ($p = .01$) or were fed exclusively with expressed breast milk in the preceding 24 hours ($p = .02$). Researchers also concluded that 96% of the experimental mothers “expressed satisfaction with their early postpartum care, which included early discharge and home care visits by lactation nurses” (McKeever et al., 2002, p. 261). Specifically, mothers found the one-to-one support for breastfeeding the most helpful part of their at home care. These

researchers found that mothers who were helped by the certified lactation nurses in their homes had more success with breastfeeding in the first 12 postpartum days as compared to the standard group. This study demonstrated the value of lactation consultant support in the home setting during the early postpartum period.

According to Wambach et al. (2005), maternal characteristics play a large role in whether or not women initiate breastfeeding. Women who are married, older in age, have higher education, and more wealth tend to breastfeed more than women who do not possess these characteristics. Additionally, researchers found that individuals with a “negative breastfeeding experience” were more likely to not breastfeed their infants in subsequent pregnancies (Wambach et al., 2005, p. 247). Forste and Hoffmann (2008) identified some additional maternal factors that were associated with a higher prevalence of breastfeeding. They found that women who live in the western United States and those who were foreign born were more likely to breastfeed.

Common breast feeding concerns of mothers have been identified that may create a negative experience or discourage breastfeeding. These concerns are “sore nipples, engorgement, mastitis, and perceived or actual insufficient milk supply” (Wambach et al., 2005, p.248). One of the most often reported reasons for women to stop breastfeeding was due to sore nipples (Wambach et al., 2005). Researchers also found that both teen mothers and adult women had comparable types of physical breast discomforts, worries about insufficient milk, and fatigue when it comes to breastfeeding experiences (Wambach et al., 2005). One nurse researcher reported that mothers who experienced problems with the baby latching on and who felt pain while breastfeeding were more likely to supplement their breastfeeding or discontinue breastfeeding altogether (Cadwell, 2007). Additionally, she found that when a woman’s breastfeeding was assessed methodically it played a part in successful breastfeeding (Cadwell, 2007). In another study, researchers found similar results. Scott, Binns, Oddy, and Graham (2006) found that the women in their study who

experienced early difficulty in breastfeeding were at higher risk for early cessation of breastfeeding. Specifically women that had problems breastfeeding within the first 4 weeks “were significantly more likely to discontinue full breastfeeding before 6 months and to have a shorter duration of breastfeeding overall” (Scott et al., 2006, p.653).

Another study done by Kanotra et al. (2007), examined the challenges faced by new mothers in the early postpartum period and found that breastfeeding issues were the second most common theme; 23.5% of the new mothers in the study had concerns about breastfeeding. This study utilized qualitative data from the Pregnancy Risk Assessment Monitoring System (PRAMS). These researchers coded data from 324 women that commented on their postpartum concerns and concluded that new mothers would like more support and education. Many of the mothers commented on the isolation of staying home with their infants and desired having someone with experience to provide support (Kanotra et al., 2007). This study demonstrated the potential for telehealth to connect new mothers with the support and assistance of a certified lactation consultant.

Researchers Graffy and Taylor (2005) examined what type of information, advice, and support women desire with breastfeeding. They performed a qualitative analysis of women’s responses to a questionnaire that was administered when the mother’s infants were 6 weeks old. The questionnaire asked about the mother’s experiences of breastfeeding support. There were 654 women who began breastfeeding and completed the questionnaire. Of the total, 492 (75%) of the participants were first time mothers. Researchers reported that at 6 weeks, 249 (38%) of participants were exclusively breastfeeding, 183 (28%) of participants were doing both formula feedings and breastfeedings, and 222 (34%) were exclusively formula feeding (Graffy & Taylor, 2005). Among the women who had stopped breastfeeding, researchers found that many wished they had been able to breastfeed longer and felt that they did not have the necessary support for

breastfeeding. From the questionnaires, women reported that they would have liked more accurate information on breastfeeding including what to expect and potential problems they may face. Additionally, participants wished that they had known more about the benefits of breastfeeding to help encourage them to continue. Other comments that participants felt were helpful for breastfeeding support were having advice on how to position their baby and helping the baby to latch on. Women also enjoyed the practical tips about treating and coping with sore nipples, engorgement, how to time the feedings, and express milk. Overall, Graffy and Taylor's (2005) study demonstrated that their participants responded positively to the support they received from their counselors and this increased their comfort and success with breastfeeding.

METHODS

Design and Measures

This feasibility study utilized a descriptive design to collect observational breastfeeding data via interactive televideo consultation and face to face home visitation. The parent study was designed to test the interrater reliability of breastfeeding assessment techniques between two lactation consultants using the LATCH scoring system. Additionally, the study assessed breastfeeding problems and issues, patient teaching using interactive problem guidance, and the implementation of educational materials. The ancillary study was designed to identify the breastfeeding experiences of mothers at 1 and 4 weeks postpartum via the BES, and to determine if telehealth enhanced breastfeeding support via the guided interview questionnaire.

Sample and Setting

The target sample size for the parent study was 10 mother/baby dyads. The study is ongoing and the target sample has not been achieved at this time. This was a convenience sample. For this ancillary study, seven postpartum mother-infant dyads from the maternity unit of a 600 bed

university-affiliated hospital in the Midwest and a free standing birthing center were recruited for participation. Participants were enrolled during their hospital/birthing center stay or after discharge.

Inclusion Criteria

In order to participate, the postpartum women had to be 18 and older; English speaking, with no medical complications; planned to breastfeed or initiate breastfeeding after birth; had healthy full term infants (>37 weeks gestation or weight>2500 gm); had access to a significant other or helper for the telehealth sessions (spouse/partner, mother, etc), and had high speed internet access with their computer at home.

Exclusion Criteria

Women were excluded if they had multiple gestation births (e.g. twins), infants with complications that separated them from their mothers for longer than 4 hours at birth; postpartum complications such as pre-eclampsia treated with magnesium sulfate or pregnancy-induced-hypertension; and a history of breast surgery or breast reduction.

Ethics

This study was approved by the KUMC Human Subjects Committee. An amendment to the protocol was submitted to include the Breastfeeding Experience Scale for the ancillary study. Informed consent was obtained from all participants at enrollment.

Data Collection Instruments

Participant information regarding gender, age, education, employment, marital status, income, and ethnicity was collected using the demographic data form developed for this study. The participants completed the demographic data form during study enrollment.

The LATCH tool is a 5 item assessment tool that identifies areas of needed intervention and teaching for breastfeeding mothers. The LATCH tool assesses 5 components of breastfeeding: ability of baby to “Latch”, the amount of “Audible” swallowing, mother’s nipple “Types”, mother’s level of “Comfort”, and the amount of “Help” the mother needs. The LATCH scores for each component range from 0 to 2 for a possible total score of 0 to 10. The LATCH scores were collected at baseline in the hospital and weekly through week 4 postpartum (Jensen, Wallace, & Kelsay, 1994).

The Breastfeeding Experience Scale (BES) is a 30-item questionnaire that measures breastfeeding outcomes in terms of early breastfeeding events/experiences, feeding practices/patterns, and breastfeeding duration (Wambach, 1990). The first 18 items of the tool provide information about various breastfeeding experiences or problems and are responded to on a 5-point rating scale of severity (1 = not at all, 2 = mild, 3 = moderate, 4 = severe, 5= unbearable). These items are summed together for a total score ranging from 18-90. The second part of the tool is used to document weaning experiences and formula supplementation practices. Descriptive statistics and content analysis were used for the second section of the BES.

The Telehealth Assessment Checklist was adapted from Smith, Cha, Kleinbeck, Clements, Cook, and Koehler (2002) and was used to assess the quality of pictures, sounds, and delivery of teaching content during the telehealth visit by both mother and telehealth lactation consultant.

The interactive home telehealth satisfaction scale from the American Telemedicine Association Toolkit was administered to measure participant satisfaction regarding home telehealth and equipment use. The participant section consisted of 20-items, with 6-point response options, and the scores range from 20-120. Higher scores indicate stronger satisfaction. In addition, 3 items asked about the ease and quality of the equipment (American Telemedicine Association, 2009).

Finally, guided interview questions were used to elicit participant perceptions and experiences of the telehealth lactation visit, its impact on their breastfeeding practice, and strengths and weaknesses of the method of support. The guided interview question 1 was used to determine if the mothers felt they had an improved breastfeeding experience because of their telehealth experience. In addition, mothers were asked if they felt they had a decrease in breastfeeding problems because of their participation in the study.

Procedures

After eligible study candidates received study information and agreed to participate in the study, they signed the informed consent form. The participants were then interviewed by a research assistant to obtain demographic information and data on the delivery, family, and hospital breastfeeding experiences using the demographic form. Each participant received 4 telehealth and 2 home visits. These visits were scheduled prior to the participants' discharge from the hospital or shortly afterward if enrolled in the study after hospital discharge.

During the postpartum hospital stay, the hospital lactation consultation conducted an assessment of breastfeeding technique. The lactation consultant also assessed for problems such as sore nipples, cracked nipples, blisters, ecchymosis, engorgement, and tenderness. These data, which are components of the LATCH tool, were shared with the study research assistant who gathered the baseline demographic/birth data. The LATCH assessment tool was also utilized during the telehealth and home visits. For those study participants who were enrolled in the study after hospital discharge, in-hospital or birthing center lactation assessment information was not available.

In addition, the lactation consultant evaluated the quality of pictures, sounds, and delivery of teaching content during the telehealth visit using a standard form. At the first and fourth post partum week, the research assistant administered the BES tool via the telephone. At the end of the 4

weeks, participants were asked to report their experiences and evaluate the teleconferencing equipment and education materials.

During the first 2 weeks, the home and telehealth visit was made simultaneously by the lactation consultants. At the first home visit, the lactation consultant installed the telehealth equipment. To ensure interrater reliability, a total of 20 breastfeeding observations were conducted by the lactation consultants during the 2 visits. The third and fourth postpartum visits were with the telehealth lactation consultant only. If participants stopped breastfeeding during the 4 week study period, they were asked to describe their breastfeeding experiences and their reasons for discontinuing breastfeeding.

Prior to the study, the certified lactation consultants were trained to perform the LATCH assessment to an interrater reliability level of at least 90% to assure consistency in use of the LATCH scoring system (Salkind, 2006). The telehealth lactation consultant was trained to use the teleconferencing equipment at the Kansas University Center for Telemedicine and Telehealth and the home lactation consultant was trained in installing the home teleconferencing equipment.

Lactation consultants used a standard protocol for setting up the equipment, preparing mothers and their participating helper for the telehealth visit, and standard educational materials were used to assure consistency of home equipment set up and study conditions.

The Kansas University for Telemedicine and Telehealth loaned a Logitech web-camera to each participant. The small camera rested on the top of the computer monitor and provided high quality, interactive audio and video conferencing. Each camera-computer system met advanced encryption standards for secure, private, connection to the lactation nurse. Participants were required to have internet access in their home and a minimum bandwidth of 384 kbps. External speakers, headsets, and microphones were also loaned to participants as needed.

Data Analysis

SPSS/PC Version 17 was used for statistical analyses. Descriptive statistics were utilized to summarize participants' demographic information and mean LATCH scores. The analysis for each research question is addressed below:

Parent Study Data Analysis Plan

Research Question 1. Interrater reliability of the LATCH scores between the two lactation consultants was computed for percent of agreement (P_0) on each of the 5 LATCH items at 1 and 2 weeks postpartum (20 observational units). Cohen's Kappa (P_c) was computed to provide correction for chance agreement (Waltz et al., 2005).

Research Question 2. Data from the Telehealth Assessment Checklist was analyzed using descriptive statistics regarding sound, quality of the video camera, and clarity of pictures.

Research Question 3. Data from the telephone interview at the end of 4 weeks postpartum was analyzed using qualitative narrative analysis. Information was used to suggest facilitators and barriers to telehealth services and to refine the telehealth protocol for future trials.

Ancillary Study Data Analysis Plan

Research Question 4. Data from the Breastfeeding Experience Scale (BES) at 1 and 4 weeks postpartum was analyzed using descriptive statistics. The total BES scores were calculated by summing individual items/problem severity. At week one, item 18 (breastfeeding in the context of return to work) was not included in the total scoring of the BES because no mothers were working outside the home. At week 4, two mothers were working outside the

home and the total score was based on all 18 items. In addition, individual item scores were ranked by frequency and severity to determine which problems occurred most frequently, as well as which problems were rated as most severe in the sample of 7 mothers. The numbers of mothers who continued to breastfeed and who had weaned at 4 weeks were calculated, and reasons for weaning and formula supplementation patterns were analyzed with frequencies and narrative analysis.

Research Question 5. Data from the telephone interview at the end of 4 weeks postpartum about mother's perception of telehealth on their breastfeeding experience were analyzed with narrative analysis. Mothers were asked to tell the research assistant about their experiences with the telehealth lactation consultant in assisting them to breastfeed. In this open ended questionnaire, mothers were asked if they felt that they had an improved experience because of telehealth or if they felt they had less breastfeeding problems because of their participation.

RESULTS

Sample Characteristics

Table 1 describes the mothers in this sample. Over half of the women were White (57%), the majority were married (71%), and their range in age was 23-37, with a median age of 28 years. The highest level of education ranged from partial college to doctoral degrees. The women's family yearly income ranged from \$10,000 or less to over \$70,000. Table 2 describes the pregnancy and delivery information. Over half of the women were primiparous (57%) and had vaginal deliveries (71%). The women's median gestation was 40 weeks, over half of the baby's were female (57%) with a median weight of 8.1 pounds. Table 3 describes the mother's work and breastfeeding plans. Two of the mothers planned to return to work. Mothers planned length of breastfeeding ranged

from 6-26 months and a median of 12 months. All 7 mothers planned to exclusively breastfeed their infants.

Table 1 Subject Demographic Distribution

Ethnicity (Frequency)	Age	Marital status (Frequency)	Highest education (Frequency)	Family's yearly income (Frequency)
Black (1)	Range 23-37	Married (5)	Partial college (2)	\$10,000 or less (1)
White (4)	Median 28	Single (1)	Associate's degree (1)	\$10,001 to \$25,000 (1)
French (1)		Living with partner (1)	Bachelor's degree (3)	\$25,001 to \$40,000 (2)
West Indian (1)			Doctoral degree (1)	\$55,001 to \$70,000 (1)
				Over \$70,000 (1)
				Not Applicable (1)

Table 2 Pregnancy and Delivery Distribution

Parity (Frequency)	Type of delivery (Frequency)	Baby's birth weight (Frequency)	Baby's gestation	Baby's gender (Frequency)
Primiparous (4)	Vaginal (5)	Range: 6.30-9.10 lbs	Range: 39-42 weeks	Female (4)
Multiparous (3)	Cesarean Section (2)	Median: 8.1 lbs	Median 40 weeks	Male (3)

Table 3 Work and Breastfeeding Plans

Plan to return to work (Frequency)	Breastfeeding status (Frequency)	Breastfeeding plan in months
Yes (2)	Breastfeeding only (7)	Range 6-26 months
No (5)		Median 12 months

Research Question 4. What are the breastfeeding experiences and problems of mothers at 1 and 4 weeks postpartum?

Descriptive statistics were calculated for each item in the BES. The week 1 item responses indicated mild problems overall. Sore nipples had a median score of moderate (3), and engorgement had a median score of mild (2). Cracked nipples, difficulty latching on, baby reluctant to nurse due to

fussiness, breast infection, sucking difficulty, and embarrassed when nursing all had median scores of (1) and were not experienced by the mothers.

The total BES score at week 1 ranged from 23-45 out of a possible range of 17-85 and the median was 30. The most frequently reported problem at 1 week was mothers feeling tired/fatigued (85.8%). The next most frequently reported problems were sore nipples (85.7%) and baby's reluctance to nurse due to sleepiness (85.7%). The most severe problems reported at 1 week were sore nipples (3), engorgement (2), baby's reluctance to nurse due to sleepiness (2), leaking breasts (2), baby nursing too frequently (2), worry about not having enough milk (2), mothers feeling tired/fatigued (2), worry that baby not getting enough milk (2), difficulty positioning baby (2), worry about baby's weight gain (2), and mother feeling tense and overwhelmed (2).

The week 4 individual item indicated mild responses overall. The only item with a moderate median score was feeling tired/fatigued (3). Baby reluctant to nurse due to sleepiness, baby reluctant to nurse due to fussiness, leaking breasts, and feeling tense and overwhelmed had a mild median score (2). Sore nipples, cracked nipples, engorgement, difficulty latching on, breast infection, baby nursing too frequently, worry about not having enough milk, sucking difficulty, worry that baby not getting enough milk, difficulty positioning baby, worry about baby's weight gain, embarrassed when nursing all had a median score of not at all (1).

The total BES score at week 4 ranged from 23-40 out of a possible range of 18 – 90, and the median was 25; overall very low severity total scores. The most frequently reported problems at 4 weeks were mothers feeling tense and overwhelmed (85.8%), mothers feeling tired and fatigued (85.8%), baby's reluctance to nurse due to fussiness (71.4%), and baby's reluctance to nurse due to sleepiness (71.4%). The most severe problems reported at 4 weeks were mothers feeling tired/fatigued (3), mothers feeling tense and overwhelmed (2), baby's reluctance to nurse due to fussiness (2), and leaking breasts (2).

At week 1, only one mother was supplementing with formula 3 times a day. The reason for using non breast milk was to serve as extra nourishment. At week 4, two mothers were supplementing with formula. One mother was supplementing to substitute a breastfeeding session and 1 mother used formula to serve as extra nourishment. Of the 2 mothers who were supplementing, 1 mother used non-breast milk 2 times every day and 1 mother used non-breast milk every 2 days. At 4 weeks, all 7 mothers were continuing to breastfeed and no mother had weaned.

Research Question 5. Do mothers think they had improved breastfeeding experience or a decrease in breastfeeding problems because of their telehealth experience?

Qualitative narrative analysis was used to analyze these questions. In the following paragraphs, quotes from the mothers will be used to illustrate their telehealth experiences. Mothers were asked to discuss their experiences about breastfeeding with the use of telehealth. Six mothers thought the use of telehealth had benefited their breastfeeding experience and they believed that they had experienced fewer problems as a result of being in the study. One multiparous mother who felt she had an improved breastfeeding experience stated “it helped to support and encourage my breastfeeding.” Another multiparous mother reported that “they brought a lot of wisdom and experience that I didn’t have with my other two kids.” Similarly, 1 primiparous mother said, “I had an improved experience because they had the knowledge to help and were able to see what I was doing so they could help me.” Another primiparous mother felt stated, “I had sore nipples in the beginning and they [lactation consultants] gave me lanolin and told me about Hydrogel™ pads.” Six of the mothers reported a decrease in breastfeeding problems. One multiparous mother explained her improved breastfeeding experience when she compared it to her previous pregnancies. “Yes, I had less problems breastfeeding this time. With my last two pregnancies I had cracked nipples and bleeding and was just really sore.” One primiparous mother agreed that during the four weeks of the study, “I had a decrease in breastfeeding problems. It has made it easier. I had my questions

answered faster. I had more access to resources because I had the lactation consultant's support. It kept me going." As a result of being in the study, 1 primiparous mother received help for her sore nipples. She stated "I had sore nipples during the first couple of weeks. She [lactation consultant] told me that I could buy lanolin cream to put on and also taught me how to hold the baby right." Another primiparous mother stated, "I have had less positioning problems." Overall, regardless of parity 6, of the 7 mothers agreed that being in the study had been beneficial to their breastfeeding experience and that they felt they had fewer problems over the course of the 4 weeks due to their participation in the study.

DISCUSSION

The results of this study indicate that in the first week postpartum the majority of mothers most frequently felt tired and fatigued, experienced sore nipples, and some felt their babies were reluctant to nurse due to sleepiness. At 4 weeks, mothers expressed the same issues. They continued to feel tired and fatigued and they reported their babies were reluctant to nurse due to sleepiness. The experience of sore nipples was more frequent early on and by 4 weeks this was not a frequent experience for mothers in this study.

The results of this study indicate that in the first week postpartum, sore nipples and engorgement were the most severe experiences of mothers. By week 4 however, mothers reported feeling more tired and fatigued and being tense and overwhelmed. This finding was supported in the literature as engorgement occurs when there is an "imbalance between supply and demand of the milk. This is most likely to happen in the first few days" (Bainbridge, 2005, p.552). In addition to engorgement, maternal fatigue levels in the early postpartum period are common. Research demonstrates that that "maternal fatigue levels tend to be moderate, with peak levels occurring between 2 and 6 weeks postpartum" (Wambach, 1998, p.219).

Total BES scores during week 1 had a larger range and the median group problem severity score of 30 was higher than the week 4 median score of 25. Actual total severity scores ranged from 23-45 at week 1 and 23-40 at 4 weeks. Therefore the mothers at week 1 ranked their breastfeeding experiences as more severe than at week 4. This is consistent with other research using the BES, with severity of breastfeeding problems decreasing over the early postpartum weeks (Wambach, 1998; Wambach, Aaronson, Breedlove, Domian, & Yeh (in press).

The results from the narrative analysis demonstrate that the majority (n=6) of women regardless of their parity found telehealth lactation support helpful for their breastfeeding experience and believed they had a decrease in breastfeeding problems during the 4 weeks because of their participation in the study. One primiparous mother stated, “it was nice to have them help me, having encouragement and support were huge positives. It gave me the strength to carry on.” These positive results support earlier findings that lactation support in the early postpartum period is related to increased duration and breastfeeding exclusivity (Wambach et al., 2005). At four weeks, all of the women in the study were breastfeeding and 5 of the 7 were breastfeeding exclusively. This study suggests that in home lactation support using telehealth may promote positive breastfeeding experiences and outcomes for women in the first 4 weeks postpartum.

Limitations

This is a small pilot study designed to examine the feasibility and reliability of using telehealth for assessment and breastfeeding support. Since the primary aim was to determine if telehealth could be used for this purpose it may not be generalized to all breastfeeding mothers. In addition, due to the small sample size, the (n=7) and the large number of highly educated women who participated, the results may not be representative of all breastfeeding mothers.

CONCLUSION AND IMPLICATIONS

Results from this study demonstrate that women in the early postpartum period experience many concerns such as sore nipples and engorgement that may pose as a barrier to breastfeeding. However with the help of lactation consultants the women in this study had access to the resources to encourage and support their breastfeeding. In addition the majority of mothers (n=6) felt that they had fewer problems during the study due to the use of telehealth lactation support. This study demonstrated that telehealth lactation consultants are able to assess breastfeeding and provide support to breastfeeding mothers. The majority of women (85%) in this study reported that telehealth was beneficial to their breastfeeding experience. In addition the majority of women (85%) in this study stated that they did feel that they had a decrease in breastfeeding problems because of their telehealth breastfeeding support. This small study demonstrates that telehealth may be a useful tool in providing breastfeeding assessment and support and more research is essential in this area.

REFERENCES

- American Telehealth Association. (2009). ATA Home Telehealth Tool Kit.
<http://www.americantelemed.org/i4a/pages/index.cfm?pageID=3281>, accessed 12/15/09.
- American Academy of Pediatrics. (2005). Breastfeeding and the use of human milk. *Pediatrics*, 115, 496-506.
- Bainbridge, J. (2005). Dealing with breast and nipple soreness when breastfeeding. *British Journal of Midwifery*, 13, 552-556.
- Bonuck, K., Trombley, M., Freeman, K., & McKee, D. (2005). Randomized, controlled trial of a prenatal and postnatal lactation consultant intervention on duration and intensity of breastfeeding up to 12 months. *Pediatrics*, 116, 1413-1426.
- Cadwell, K. (2007). Latching-on and suckling of the healthy term neonate: Breastfeeding assessment. *Journal of Midwifery & Women's Health*, 52, 638-642.
- Flower, K., Willoughby, M., Cadigan, R., Perrin, E., & Randolph, G. (2008). Understanding breastfeeding initiation and continuation in rural communities: a combined qualitative/quantitative approach. *Maternal & Child Health Journal*, 12(3), 402-414.

- Forste, R., & Hoffmann, J.P. (2008). Are U.S. mothers meeting the healthy people 2010 breastfeeding targets for initiation, duration, and exclusivity? The 2003 and 2004 national immunization surveys. *Journal of Human Lactation*, 24, 278-288.
- Graffy, J., & Taylor, J. (2005). What information, advice, and support do women want with breastfeeding? *Birth*, 32, 179-186.
- Ip, S., Chung, M., Raman, G., Chew, P., Magula, N., DeVine, D., Lau, J. (2007). Breastfeeding and maternal and infant outcomes in developed countries. *Evidence Report Technology Assessment (Full Report)*. 153, 1-186.
- Jensen, D., Wallace, S., & Kelsay, P. (1994). LATCH: A breastfeeding charting system and documentation tool. *Journal of Obstetrics and Gynecologic, and Neonatal Nursing*, 23, 27-32.
- Kanotra, S., D'Angelo, D., Phares, T.M., Morrow, B., Barfield W.D., & Lanksy, A. (2007). Challenges faced by new mothers in the early postpartum period: An analysis of comment data from the 2000 pregnancy risk assessment monitoring system (PRAMS) Survey. *Maternal and Child Health Journal*, 11, 549-558.
- Lindberg, I., Ohrling, K., & Christensson, K. (2007). Midwives' experience of using videoconferencing to support parents who were discharged early after birth. *Journal of Telemedicine & Telecare*, 13, 202-205.
- McKeever, P., Stevens, B., Miller, K., MacDonell, J., Gibbins, S., Guerriere, D., et al. (2002). Home versus hospital breastfeeding support for newborns: a randomized controlled trial. *Birth: Issues in Perinatal Care*, 29, 258-265.
- Salkind, N. (2006). Tests and measurement for people who hate tests and measurement. Thousand Oaks, CA: Sage Publications.
- Scott, J.A., Binns, C.W., Oddy, W.H., & Graham, K.I. (2006). Predictors of breastfeeding duration: Evidence from a cohort study. *Pediatrics*, 117, 646-655.
- Smith C.E., Cha, J., Kleinbeck, S.V.M., Clements, F., Cook, D., & Koehler, J. (2002). Feasibility of in-home telehealth for conducting research. *Clinical Nursing Research*, 11, 220-233.
- U.S. Health Resources and Services Administration. (2009). Office for the Advancement of Telehealth. <http://www.hrsa.gov/telehealth/default.htm>, accessed 12/15/2009.
- Waltz, C., Strickland, O., & Lez, E. (2005). Measurement in nursing and health research. New York: Springer Publishing Company.
- Wambach, K. (1990). *Development of an instrument to measure breastfeeding outcomes: The breastfeeding experience scale*. Unpublished manuscript, The University of Arizona, Tucson.
- Wambach, K.A. (1998). Maternal fatigue in breastfeeding primiparae during the first nine weeks postpartum. *Journal of Human Lactation*, 14, 219-229.

Wambach, K., Aaronson, L., Breedlove, G., Domian, E., & Yeh, H. (in press). A randomized controlled trial of breastfeeding support and education for adolescent mothers. *Western Journal of Nursing Research*.

Wambach, K., Hetzel Campbell, S., Gill, S.L., Dodgson, J.E., Abiona, T.C., & Heinig, M.J.(2005). Clinical lactation practice: 20 years of evidence. *Journal of Human Lactation*, 21, 245-258.

DEVELOPING A CENTER FOR NURSING SCHOLARSHIP AND LEADERSHIP IN KANSAS

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requirements for the Nursing Honors Program

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ABSTRACT

Most states in the United States have nursing centers that focus on workforce issues, although some centers focus on nursing research and scholarship. Kansas does not currently have a state-wide center of any type. In recent summits of nurse educators and clinical nurses in Kansas, participants identified the need for a state-wide center for nursing excellence that would support nursing research, scholarship, and the development of nurse leaders. Prior to developing the new center, data from state workforce and other centers of nursing excellence were collected to identify the purpose, mission, organizational structure, and funding mechanisms that have guided development of other centers. Data were collected from the web sites of the 33 established workforce centers and from several additional, institution-based centers. Content analysis was used to identify common themes for the purpose, structure, and funding of centers and these findings. In addition to the summary reports from the state-wide summits of nurse educators and clinical nurses, were used to guide development of a proposed center for Kansas. The Kansas Center for Nursing Scholarship & Leadership will be virtual, independent, and not-for-profit. The Center will have an Advisory Council that will include participants state-wide, from all levels of nursing education, nursing practice, and regulatory partners. Strategies for development, implementation, and evaluation of a state-wide Center for Nursing Scholarship and Leadership are discussed. In addition, strategies for promoting innovative, collaborative projects across educational levels and between schools and clinical partners are suggested.

INTRODUCTION

For the past several years, the professional nursing workforce has experienced a shortage in the number of practicing registered nurses. It is expected to continue for the next decade (American Association of Colleges of Nursing, 2010). This nurse shortage has resulted in questions concerning the education of nurses, preparation of nurse leaders, and evidence-based and best practice implementation. Questions of how to best recruit and retain adequately prepared nurses to care for the ever increasing acuity of patients also have arisen (Cash, Daines, Doyle, & von Tettenborn, 2009). In the United States, attempts at creating and enhancing state nursing workforces have been achieved through nursing centers. Nursing centers have been created with diverse goals, including developing the nursing workforce, and developing and testing strategies to improve patient care, education, research, leadership, and management (Knox & Gharrity, 2004). Existing centers vary with respect to purpose, structure, and funding mechanisms. Some are centered on workforce issues, with goals focused on responding to the nursing shortage, while others focus on improvement of nursing care quality within the state.

Currently, the state of Kansas does not have a nursing center. In two 2009 state-wide summits for nurse educators and clinical nurses, nursing leaders in Kansas identified the need for a Center for Nursing in the state. Concurrently, this need was identified by member schools of the Kansas Association of Colleges of Nursing. In this qualitative study, the literature regarding centers for nursing, partnerships, and nursing workforce was reviewed to identify the purpose, structure, and funding mechanisms of established state-wide nursing centers. These findings were used to guide development of a Kansas Center for Nursing, to complement the goals of the state's nursing professionals and educators that were expressed during the state-wide summits. Through the development of partnerships, the center will help stimulate innovation, support investigation of nursing education and best practices, and spread research of best practices in Kansas.

Research Questions

Two questions helped guide the research methods:

- What are the models of centers for nursing in the United States?
- In guiding center development, what models of nursing centers complement the goals of nurse professionals in Kansas?

Background

Thirty-three states in the United States have an established center focused on the nursing profession within the state. A center for nursing has various purposes that depend on the goals within an organization. Each organization, or in this case state, has different needs and the state nursing center should be designed to fit the state-based needs. A center of nursing provides a foundation for organizing quality, education, research, and values and underpinnings of nursing (Knox & Gharrity, 2004). Most importantly, a center provides a means of displaying nursing and nurses and their practice. Developing a center for nursing involves identifying a method for describing and integrating the practice, education and development, research, and management aspects of nursing. A center for nursing should include four basic components in its structure: 1.) nursing practice, 2.) leadership and management, 3.) education and development, and 4.) research and evaluation (Knox & Gharrity, 2004). Establishing a center for nursing can lead to positive outcomes including improved recruitment and retention statistics, and quality of patient care (Knox & Gharrity, 2004). Using nurses to develop a visible and recognized center for nursing, which has a structure that explains nursing internally and externally and serves as an integrating mechanism, can lead to a center that produces innovation, development, and practice (Knox & Gharrity, 2004).

The group that runs and oversees the center for nursing is a vital part of its development. Structural bodies can include schools, government, nurse professionals, and hospitals. Gersten-Rothenberg (1998) suggests schools of nursing should develop centers for nursing. Schools of nursing have

access to both formal and informal networks. They can also improve patient care and access to health care as well as provide roadways for research, training, and practice. Academically based centers for nursing also contribute to the improvement of scholarship, teaching, and training in schools. Aside from the benefits of nursing schools developing centers for nursing, Gerstan-Rothenberg (1988) also discusses the disadvantages. Unfortunately, school-based centers tend to set goals aimed towards improving the school environment and possibly the community surrounding the school, with the goals benefitting a smaller population, when compared to a state-based center. Another disadvantage for nursing schools is the lack of support. Nursing schools creating centers for nursing are not supported by medical organizations. This is because some nursing centers offer health services using advanced registered nurse practitioners. Medical organizations feel advanced practice nurses cannot provide independent care. Medical organizations feel there is a lack of research supporting quality patient outcomes with care from independently practicing advanced practice nurses. Nursing centers run by nursing schools also receive inconsistent financial support from both state and federal governments.

Before developing a center for nursing, the chances of success and sustainability should also be considered. Boblitz and Thompson (2005) suggest six steps; “forecasting demographic changes in the area, identifying service lines, calculating use rates for service lines, evaluating market trends and market share, conducting a financial review, and formulating a plan” (p.72), in assessing the feasibility of developing centers of excellence. The steps are geared towards hospital-based centers for excellence but a few are equally as valid in discussing development of a center for nursing. Assessing the need for a service, identifying how the service will sustain itself monetarily, and exploring how the service will be carried out are basic elements in development. Identifying nursing services needed in Kansas, conducting a financial review, and creating a plan for development and implementation are most important and are utilized in this study.

The existence of a nurse shortage is well documented. According to Cash, Daines, Doyle, and von Tettenborn (2009) the awareness of the shortage of nurse educators is minimal and that improvement in the work environment could help to attract and retain nurse educators. Factors that affect job satisfaction among nurse educators include stress, leadership and management, empowerment, trust and respect. The authors further suggest that nurse educators contribute to the research of their work environments in order to enhance change (2009). A center for nursing should include; nursing practice, education and development, and research and evaluation (Cash, Daines, Doyle, & von Tettenborn, 2009). A center for nursing in Kansas could aid in joining practicing nurses and nurse educators to work in a project to improve nurse educator work environments.

Several studies have been completed on partnerships in nursing. For example, partnerships between community and practicing nurses, hospitals and practicing nurses, and academic institutions and practicing nurses have been implemented (Cramer, Duncan, Megel, & Pitkin, 2009; MacPhee, 2009; Shiber & D'Lugoff, 2002; Spears, Thornton, & Long, 2008). Partnerships between nursing staff can lead to improved practice techniques, career support, and leadership, and expanded educational capacity, all of which can affirm nursing excellence (Spears et al.). The Johns Hopkins University School of Nursing has used a community partnership faculty practice model with their center for nursing (Shiber & D'Lugoff). One commonly identified concern regarding nursing centers is financial stability. After developing a center with established goals and priorities that met the needs of the organization, Johns Hopkins University School of Nursing established a center for nursing. The center encompassed partnerships with nurses and the surrounding community. The partnerships have resulted in fiscal benefit for the center (Shiber & D'Lugoff).

In an effort to resolve concerns of leaders in Nebraska about the nursing workforce, a Task Force was created in order to develop a nursing campus in a rural community. The Task Force consisted

of nursing educators and community leaders. Their job was to assess the feasibility of creating a nursing campus within the rural community. The team formed a partnership with the University of Nebraska Medical Center College of Nursing. A partnership between the University of Nebraska Medical Center College of Nursing and 19 rural counties resulted in a collaborative and successful attempt at remediating the nursing shortage within the state. There were also financial benefits and improvement in education through building a new nursing school campus (Cramer et al., 2009).

Another documented partnership occurred between an urban community hospital and university-based nurse educators. The stakeholders used a deductive approach to create a logic model.

According to MacPhee (2009), "The logic model process encompasses program planning, implementation, and evaluation...a logic model presents a program's logic or rationale. The model is designed to efficiently communicate the elements of a program that make it work. The elements are typically classified as inputs, processes or activities, outputs, and outcomes" (p. 143). This model guided formation of a practice-academic partnership, which resulted in further partnerships and collaborations including, educational workshops for nurses, affiliate academic appointments for practice educators, improved new graduate to entry-level nurse transition, and nursing research collaborations (MacPhee, 2009).

Understanding the background involved in developing and implementing a center for nursing helps to situate the development of a center for nursing in Kansas. The purpose, structure, and funding of the center must align with the needs of the state as well as the needs of the nursing educators and practice professionals. The implementation of partnerships and projects will assist in meeting such common goals as improved patient care, enhanced nursing practice, additional educational opportunities, research completion and dissemination, and an increased understanding and respect for nurses within the state. (Spears et al., 2008).

RESEARCH DESIGN AND METHODS

Before development of the Kansas Center for Nursing, a literature review was completed and a descriptive examination was conducted on the existing state-wide centers. Using the virtual network of each center, obtained from The Forum of State Nursing Workforce Centers (2009), the purpose, structure, funding, and project development of the 33 established United States centers were identified. While researching the established centers, discovery of eighteen other centers, either hospital or school based, were uncovered. These centers also were examined with regard to purpose, structure, and funding mechanisms. Data were recorded in three tables using Microsoft Excel. The first table consisted of state centers registered with the Forum of State Nursing Workforce Centers database. The second table included centers outside of that database such as hospital-based centers. The last table contained information on school-based centers. Content analysis was used in order to identify the purpose, structure, and funding mechanisms of these centers. The findings were used to inform development of a Kansas Center for Nursing. Reports from nursing summits in Kansas were compared to the center data sets, which guided the development of a purpose, structure, and funding plan for a center.

FINDINGS

Purposes, structures, and funding mechanisms between state-workforce centers, non-workforce centers, and schools varied minimally. Workforce centers focus on how to improve the state's nurse workforce through strategies such as recruitment, retention, and education. Centers outside of workforce development are more focused on research and scholarship. There are 33 state workforce centers identified from The Forum of State Nursing Workforce Centers website. Eleven centers were identified as organization or hospital-based. Seven centers were school-based. Purposes of state nursing centers include workforce development, supporting evidence-based practice, establish research agendas, secure funding for research, and support research, promote

nursing through scholarship and research grants, and develop public awareness, provide scholarships, publish work by nurses, support nursing research, and raise money to fund these projects. Reoccurring themes within purposes are workforce development (n=20), research promotion (n=17), scholarship (n=5), and health promotion (n=9).

Structural components of nursing centers do not always consist of a single structural body. In some centers, an Advisory Board may be dissected into various steering committees; each in charge of handling a function of the center. Structures utilized by state nursing centers include; the State Board of Nursing, State Hospital Association, State Nurses Association, Board of Directors both appointed and volunteer members, Advisory Boards, Governance Councils, Steering Committees, and independent or non-profit organizations. Most commonly, nursing centers are overseen by a board whether a Board of Directors (n=9), Advisory Board (n=4), or committee (n=6). Another common theme included independent, non-profit centers (n=6).

Funding mechanisms, like structures of nursing centers, frequently involve more than one type of support. Funding may be federal, state, contributed from organizations or individuals, hospital-based, partnership associated, or come from foundations and grants. Some centers, the New Mexico Center for Nursing Excellence for example, implement fundraising activities in order to remain financially stable. Grants (n=9), foundations (n=5), partnerships (n=8), contributions (n=10), and state funding (n=7) are common themes in terms of funding state nursing centers. There were minimal differences in structures and funding mechanisms among the three types of nursing centers.

Summit reports from nurse educators and clinical nurses in Kansas helped guide center development. For example, the need for a focus on scholarship in order to promote and support research and evidence-based practice was identified as an important feature for the new center to have. Summit participants expressed concerns regarding the separation between eastern and

western Kansas. Activities implemented on one side of the state may not be known or recognized on the other side of the state. Therefore, a need for research dissemination was identified. In order to develop new nurse leaders in Kansas, a focus on mentorship was suggested. Nurse educators and clinical nurses also expressed a need for independence in regards to the structure of the Kansas Center for Nursing, thus the center will not be overseen by a regulatory group, school, or hospital-based organization.

The Kansas Center for Nursing Scholarship & Leadership

In order to gain feedback from stakeholders, the draft plan and supporting information were presented at the Kansas Organization of Nurse Leaders (KONL) Tri-Council meeting in Salina, Kansas in January 2010. After gaining support from KONL for the proposal, the finalized Center plan was presented during the “Seeking Innovations in Nursing Education” nursing faculty and provider summit in Wichita, Kansas in March 2010. Significant support for the Center plan was expressed during the state-wide summit.

The purpose of the Kansas Center for Nursing Scholarship & Leadership is to advance the development and dissemination of nursing scholarship in Kansas through focused mentorship and broad-based collaboration. Kansas educators and clinical nurse leaders expressed concern regarding a disconnect between the eastern and western sides of Kansas. Research taking place on one side of the state will not always reach the other side. A need for partnership and collaboration was represented in the Center purpose statement.

Upon examination of the background information along with discussion between stakeholders, the center will be an independent, not-for-profit organization. An Advisory Council will be formed with representation from nursing providers as well as all educational program levels including; practical, associate degree, baccalaureate degree, and graduate nursing programs. Also, regulatory board members, including those from the Kansas State Board of Nursing, Kansas State Nursing

Association, Kansas Board of Regents, and Kansas Hospital Association, will serve on the Kansas Center for Nursing Scholarship & Leadership Advisory Council. In order to ensure equal access to the center and its resources to nurses across the state, the center will have a virtual location.

Funding mechanisms will involve initial funding for development of the center including creating a website, and providing funding for nursing scholarship projects. Start-up funds will come from the Robert Wood Johnson Foundation Executive Nurse Fellows program through Alum Fellow, Dr. Cynthia Teel. Grant and Foundation support will be sought for future funding. The Kansas Center will be implemented in the Summer of 2010.

There are remaining steps in progress and short term goals to reach. Members to serve on the Advisory Council need to be identified. A web-presence needs to be created for the Kansas Center. Creating a mechanism for supporting projects through the Center, including developing a call for proposals and a review and award process, still needs to be completed.

DISCUSSION AND CONCLUSION

The set-up and development for the Kansas Center for Nursing Scholarship & Leadership has been researched, reviewed, and agreed upon. Now the process of guiding and implementing the activities of the center must begin. A review of literature identified key concepts and valuable suggestions in developing a center for nursing. Boblitz and Thompson (2005) presented a developmental plan for establishing a center that involved assessing the need for center services, assessing funding mechanisms, and creating a plan for development. The need for a Kansas Center for Nursing Scholarship & Leadership was identified. A planning group was formed and assessment of center purpose and feasibility began. Development of the center incorporated nurse educators, leaders, and clinical nurses. This resulted in suggestions from many areas of the nursing profession. The Center purpose encompasses the goals of these nurse leaders in Kansas, as suggested by Knox and

Gharrity (2004). The goals involve implementation of partnerships between students and educators, clinical nurses and educators, and students and clinical nurses. Partnerships are a vital component in the Center's function and will aid in positive outcomes for the stakeholders involved (Cramer et al., 2009; MacPhee, 2009; Shiber & D'Lugoff, 2002; Spears et al., 2008).

Addressing the state's need for a nursing center and creating a center focused on research, scholarship, and leadership will help to alleviate problems within the nursing workforce in Kansas. Through the Center, nurses in Kansas will disseminate research findings, collaborate, form broad-based partnerships throughout the state, and, ultimately, have another means to investigate and use best care practices to meet the health needs of Kansans.

REFERENCES

- American Association of Colleges of Nursing (2010). Nursing shortage fact sheet. Retrieved from <http://www.aacn.nche.edu/media/pdf/NrsgShortageFS.pdf>
- Boblitz, M. C., & Thompson, J. M. (2005). Assessing the feasibility of developing centers of excellence: Six initial steps. *Healthcare Financial Management*, 59(10), 72-84.
- Cash, P. A., Daines, D., Doyle, R. M., & von Tettenborn, L. (2009). Quality workplace environments for nurse educators: Implications for recruitment and retention. *Nursing Economics*, 27, 315-321.
- Cramer, M., Duncan, K., Megel, M., & Pitkin, S. (2009). Partnering with rural communities to meet the demand for a qualified nursing workforce. *Nursing Outlook*, 57, 148-157.
- The Forum of State Nursing Workforce Centers (2009). Retrieved from <http://www.nursingworkforcecenters.org/>
- Gersten-Rothenberg, K. (1998). Should schools of nursing develop nursing centers? *Clinical Nurse Specialist: The Journal for Advanced Nursing Practice*, 12(2), 59-63.
- Knox, S., & Gharrity, J. (2004). Creating a center for nursing excellence. *JONA'S Healthcare Law, Ethics, and Regulation*, 6(2), 44-51.
- MacPhee, M. (2009). Developing a practice-academic partnership logic model. *Nursing Outlook*, 57, 143-147.
- Shiber, S., & D'Lugoff, M. (2002). A win-win model for an academic nursing center: Community partnership faculty practice. *Public Health Nursing*, 19, 81-85.

Pendley, A. Developing a Center for Nursing Scholarship. Summer 2010.

Spears, P., Thornton, D., & Long, L. M. (2008). Journey to nursing excellence: Building partnerships for success. *Nurse Leader*, 59-66.

MAGNET STATUS: IMPLICATIONS FOR QUALITY OF PATIENT CARE

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ABSTRACT

Research has shown that hospital structure, e.g. nursing characteristics, affects patient outcomes. Nursing characteristics have been shown to be better in Magnet® hospitals. Previous studies have found that nursing workforce characteristics such as nurse-to-patient ratio, job satisfaction, and skill mix correlate with lower incidence of nosocomial infection and higher nurse-reported and patient-reported quality of care. Little research has been done, however, on the correlation between Magnet status and patient outcomes. The purpose of this study was to determine if patients have fewer nosocomial infections in Magnet hospitals than non-Magnet hospitals. The Donabedian structure-processes-outcomes model for assessing quality of health care was the underlying conceptual framework for the study. The study design employed a descriptive correlational design. Over 500 critical care units from hospitals participating in the National Database of Nursing Quality Indicators® contributed data for the analysis. T-tests indicated that there was a higher number of total nursing hours per patient day (TNHPPD), percentage of RNs with a bachelor's degree, and higher job satisfaction scores, on critical care units in Magnet accredited facilities than those without Magnet status ($p < 0.001$). The mean rates of three types of nosocomial infections were similar for Magnet and non-Magnet hospitals, and no significant correlations were found between these workforce characteristics and patient outcomes. The analysis conducted for this study did not support the hypothesis that Magnet hospitals would have lower nosocomial infection rates because they have superior nursing workforce attributes. Further research is indicated to determine why the workforce characteristics that contribute to Magnet accreditation do not lead to a higher quality of care, and to find what factors do determine higher quality of patient care.

INTRODUCTION

Quality of patient care in hospitals is a topic of concern as we debate the organization of the healthcare system and the economics of healthcare. How can hospitals provide the best care for the best value? Hospital-acquired infections are an indication of a quality concern and an avoidable cost to hospitals. Because they are reasonably preventable, the Centers for Medicare and Medicaid services (CMS) hospitals no longer receive Medicare reimbursement for costs incurred because of these hospital-acquired infections (Centers for Medicare and Medicaid Services, 2008). Aside from the obvious economic value in preventing infections, patients have the right to expect the highest possible quality of care (American Hospital Association, 2003). It is the hospital's responsibility to determine the factors that influence patient outcomes and develop plans to improve outcomes, in this instance, avoidable infections.

The quality of nursing care has been found to be instrumental in preventing patient falls, pressure ulcers, ventilator-assisted pneumonia (VAP), central line associated blood stream infection (CLABSI), and catheter associated urinary tract infections (CAUTI) (Hugonnet, Harbarth, Sax, Duncan, & Pittet, 2004; Whitman, Kim, Davidson, Wolf, & Wang, 2002). Several studies have shown associations between hospital nurse staffing characteristics, e.g. nurse-to-patient ratio, nursing hours per patient day, RN educational level, and job satisfaction, and individual patient outcomes and nurse-reported quality of patient care (Aiken, Clarke, Cheung, Sloan, & Silber, 2003; Hugonnet et al, 2004, Aiken, Havens, & Sloane, 2000; Whitman et al, 2002). In the interest of providing the highest quality of care while keeping healthcare costs reasonable, administrators need to consider what measures can be taken to improve nursing workforce characteristics that contribute to the prevention of hospital-acquired infections. Studies by Aiken et al (1999, 2000) have shown that nursing workforce attributes are higher in Magnet hospitals.

Magnet accreditation is awarded by the American Nurses Credentialing Center (ANCC) to hospitals that achieve excellence in nursing. The Magnet model was designed to recognize hospitals that provide a supportive working environment for nurses and seek to develop and implement best practices in nursing care. The Magnet program “requires hospitals to demonstrate nursing excellence in patient, nurse, and organizational results” (ANCC, 2010). According to the ANCC website (2010), the Magnet Model includes five areas of focus:

- Transformational Leadership: strong nurse leaders have the vision, knowledge, and influence to guide their team to where it needs to go, not just where it wants to go.
- Structural Empowerment: strong nurse leaders create an environment where the hospital's mission and vision come to life, and all nurses are encouraged to achieve desired results.
- Exemplary Professional Practice: nurses practice, work together, communicate, and develop professionally to achieve the highest quality of care for patients and the community.
- New Knowledge, Innovations & Improvements: nurses take the lead in research efforts, and have an ethical and professional responsibility to contribute new findings, evidence, and quality improvement to the nursing profession.
- Empirical Outcomes: strong nursing structures and processes are in place to achieve good outcomes, but nurses go further to show results and the impact of those results. Empirical outcomes move beyond what nurses do and how they do it to focus on: "What difference have you made?"

To date 367 hospitals have been recognized as Magnet institutions. According to the ANCC, organizations must meet several eligibility requirements in order to apply for Magnet recognition. The organization must have a Chief Nursing Officer who has a Master's degree and is responsible for maintaining nursing standards of practice. Administrators must implement the *American Nurses Association's Scope and Standards for Nurse Administrators*. The organization must have in place a

method for nurses to provide feedback without fear of retribution. A method must be in place to collect data on nurse-sensitive quality indicators at the unit level. Among other requirements, these factors are designed to ensure excellence in nursing care. (ANCC, 2010).

LITERATURE REVIEW

Aikens, Havens, and Sloane (2000) compared nursing characteristics and patient outcomes in the original American Academy of Nursing (AAN) magnet hospitals and ANCC Magnet hospitals. According to this study, the RN staff on medical-surgical units in both types of Magnet hospitals were more likely to have bachelor's degrees than RNs in non-magnet hospitals (50% in Magnet hospitals vs. 34% in non-magnet hospitals, $p < 0.001$). ANCC Magnet hospitals also had a higher RN-to-patient ratio than AAN magnet hospitals (ANCC Magnet 190:100, Original Magnet 128:100, non-magnet 109:100). Furthermore, Aikens, Havens, and Sloan (2000) utilized the Nursing Work Index (NWI-R) to determine that RNs at ANCC facilities were more likely than nurses in the original Magnet hospitals to report having greater autonomy (average score 3.01 vs. 2.86, $p < 0.001$), more control over the practice setting (average score 2.95 vs. 2.65, $p < 0.001$), and better relations with physicians (average score 3.03 vs. 2.98, $p < 0.10$). Burnout was measured by the Maslach Burnout Inventory, and nurses in ANCC hospitals were less likely to report feeling burned out than nurses in the AAN hospitals (16% vs. 28%, $p < 0.001$). ANCC nurses also reported a higher quality of patient care than those in the AAN hospitals (43% rated quality of care as "excellent" vs. 21%). Aikens, Havens, and Sloane (2000) compared this with a national convenience sample of nurse-reported quality of patient care in non-magnet facilities in which only 10% of nurses rated quality of care as "excellent." If the goals of Magnet hospitals include providing supportive working environments for nurses and providing quality care for patients using best evidence-based practice, then research should examine indicators of both, e.g. job satisfaction and rates of nosocomial infection.

A systematic review of literature by Hugonnet, Harbarth, Sax, Duncan, and Pittet (2004) found several research studies that correlate nurse staffing data and nursing staff demographics, with patient outcomes. A study by Needleman et al (2002) using data from 799 hospitals across 11 states, and a study by Unruh et al. (2003) of 211 hospitals per year for seven years, found that an increase in the number of RNs was associated with a decrease in urinary tract infections and pneumonia. Cho et al (2003) also found that an increase in the proportion of RNs was associated with a 9.5% decrease in the chance for pneumonia infections, and that an increase in nursing hours per patient day was associated with a 8.9% decrease in the chance of pneumonia infection. Both Alonso-Echanove et al (2003) and Roberts et al (2000) found that patients on critical care units were more likely to develop central line blood stream infections when the majority of their care was performed by nurses from the float pool. Fridkin et al (1996) found in a retrospective case-control and a cohort study that nurse-to-patient ratios decreased just before outbreaks of central line blood stream infections.

A systematic review of the literature by Lankshear, Sheldon, and Maynard (2005) covers 61 studies conducted in the 1990s on the association between nurse staffing and patient outcomes in acute care settings. Due to the heterogeneity of the data, the authors chose to perform a qualitative synthesis of the data, rather than a meta-analysis. The authors summarized the data into tables and included summaries of the studies determined to be of the highest quality. Lankshear et al (2005) converted various measures of staffing data from each study into a common metric of hours per patient day, so the findings could be compared across the studies. Lankshear et al (2005) outlines a longitudinal study by Mark et al (2004) that found an association between increased RN staffing levels and a decrease in rates of pneumonia, urinary tract infections, decubitus ulcers, and mortality. The Lankshear et al review also cites a cross-sectional study by Aiken et al (1999) that found an inverse relationship between the number of RNs and 30-day mortality and failure-to-rescue rates. Further research by Aiken found that mortality rates are lower when a higher

proportion of nurses were educated at the baccalaureate level. Other cross-sectional studies cited by Lankshear et al (2005) found inverse relationships between nursing hours per patient day and percent of RNs on the nursing staff and rates of mortality and nosocomial infections. A common problem in data collection was that the data were collected hospital-wide, so specific relationships between the nursing staff and the patient population in question could not be determined; overall a hospital may have had more RNs, but they did not report specifically on the number of RNs working on a specific unit in which the nosocomial infections were reported. Some studies also did not differentiate between nurses in direct patient care roles and nurses involved in administration. The author further notes that only one study took the hospitals' organizational characteristics into account and that most studies did not include data on doctors. The author suggests that future research should be broad and experimental, and that it should attempt to determine exactly why nurse staffing and skill levels affect these outcomes.

An observational study by Stone et al (2007) focuses on the effects of working conditions on elderly patients. The study was designed based on the Donabedian theoretical framework of quality healthcare. The hypothesis was that elderly patients in ICUs would have better outcomes in organizations with comparatively better working conditions. Variables associated with working conditions were organizational climate, staffing, overtime hours, wages, profit margin of the institution, and Magnet status. Patient outcomes studied were central line associated bloodstream infections (CLSBI), ventilator associated pneumonia (VAP), catheter-associated urinary tract infections (CAUTI), decubitus ulcers, and 30-day mortality rates. Not enough data were obtained regarding 30-day mortality, so those data were not analyzed. Additionally, due to the infrequent employment of nurse aides and LPNs in ICUs, not enough data was obtained to analyze the effect of skill mix on patient outcomes. In organizations in which nurses perceived a positive organizational climate, researchers found an increased incidence of CLBSI but a decrease in CAUTI. The authors suggest this contradiction may be due to the fact that the medical staff, rather than the nursing staff,

insert central lines. An increased number of RN hours per patient day was associated with a decrease in all outcomes. An increase in overtime hours was associated with an increase in CAUTI and decubiti; a decrease in overtime was associated with a decrease in CLBSI. Magnet status and nurse wages were not found to be independently related to any of the outcomes measured. The sample size of the Stone study was limited and it did not take into account nurses who float. The author suggests that future studies include educational and experience level, a larger sample size, and should be longitudinal in nature. Further research should be conducted on the relationship between working conditions and patient outcomes.

A correlational study by Whitman, Yookyung, Davidson, Wolf, and Wang, (2002) examined the relationship between nurse staffing levels in terms of hours worked per patient day and central line infection rates, pressure ulcer rates, fall rates, restraint rates, and medication errors. The study attempted to determine relationships at a unit level, rather than a hospital level, because: (1) this data would be more useful to administrators in developing staffing plans, and (2) hospital-level data do not specify on which units or for which patients more staffing hours are needed. The study was a secondary statistical analysis of staffing hours and patient data from 95 units (cardiac intensive care, $n = 15$; noncardiac intensive care, $n = 7$; cardiac intermediate care, $n = 18$; noncardiac intermediate care, $n = 12$, and medical-surgical, $n = 43$) in 10 hospitals. Staffing hours were obtained from each hospital's finance department. Infection control staff for the hospital reported nosocomial infection data, which were entered into a central database that was managed by the school of nursing. Data were analyzed using SPSS 10.0, and summarized using means and standard deviations with 0.05 levels of significance.

The study found significant variance in patient outcomes among the units. With the exception of central line infection (CLI) rates, when relationships were found between nurse hours and patient outcomes, staffing and infection rates were inversely related, as would be expected. On the other

hand, CLI rates were found to increase with nurse hours worked. The author notes that other studies have found an inverse relationship between CLI and hours worked, and that methodological differences may account for the different results.

One limitation of this study is that because the hospitals in the study had no patient classification or acuity system, risk stratification could only be completed at the unit level, rather than the patient level (Whitman et al, 2002). Furthermore, infection rates may have been underreported or incorrectly assigned to a unit. The author suggests that further research is needed on the effect of staffing on disease-specific patient outcomes.

The above studies provide evidence that nursing workforce characteristics are associated with patient outcomes and that nursing workforce characteristics are better in Magnet hospitals. Aiken et al (2000) found that nurses in Magnet hospitals were more likely to report being satisfied with their jobs than nurses in non-Magnet hospitals. This study also found a higher nurse-to-patient ratio in Magnet hospitals. Other studies as outlined in the review by Hugonnet, Harbarth, Sax, Duncan, and Pittet (2004), found inverse relationships between nurse-to-patient ratio and patient outcomes. Furthermore, the studies by Lankshear et al (2005) and Stone et al (2007) found inverse relationships between other nursing workforce characteristics, such as total nursing hours per patient day and skill mix to be inversely related to patient outcomes. Given the body of literature providing evidence of an inverse relationship between nursing workforce attributes and patient outcomes, it was determined that further research was indicated regarding Magnet status and its potential effect on patient outcomes.

PURPOSE

A review of literature found only two studies (Aiken et al 2000 and Stone et al, 2007) that examined whether there is a direct link between Magnet accreditation and a reduction in specific adverse

patient outcomes. Based on the existing evidence that patient outcomes improve when nursing workforce characteristics improve, the following research question was addressed by this study: Do patients develop fewer hospital-acquired infections in Magnet hospitals than in non-Magnet hospitals? The theoretical framework for this study was the Donabedian structure-processes-outcomes model for assessing quality of health care.

METHODS

This was a descriptive correlational study utilizing data from over 500 critical care units from hospitals participating in the National Database of Nursing Quality Indicators®. The National Database of Nursing Quality Indicators (NDNQI) at the University of Kansas Medical Center collects data from hospitals across the country on nursing-sensitive outcomes as well as nursing staff characteristics including staff mix, nursing hours per patient day (NHPPD), RN education and certification, nurse turnover, and RN job satisfaction. A representative of each participating facility, known as a Site Coordinator, collects data from the hospital's risk management and staffing systems and reports this data to NDNQI each quarter. Site Coordinators are trained to collect data in accordance with NDNQI guidelines. Job satisfaction is measured by nurses' response to a job-enjoyment survey. It is reported in the form of a T-score in which 50 represents the midpoint and 10 is the standard deviation (NDNQI, 2010).

Statisticians at NDNQI retrieved data on the following quality indicators: ventilator-associated pneumonia (VAP) rates, catheter associated urinary tract infection (CAUTI) rates, and central line associated blood stream infection (CLABSI) rates. Data on VAP, CAUTI, and CLABSI rates were only available from critical care units. Data were also retrieved on the following types of unit characteristics: total nursing hours per patient day (TNHPPD), percentage of RNs with a bachelor's degree, job satisfaction, and percentage of nursing hours supplied by RNs. T-tests were performed using Excel software to determine if each of the patient outcomes and nursing workforce

characteristics were higher in Magnet hospitals than in non-Magnet hospitals; $p < 0.05$ was considered statistically significant. A Pearson correlation matrix was developed to look for correlations between the nursing workforce characteristics and the three outcomes.

RESULTS

The results of the t-tests are shown in table 1 below. The t-tests indicated that there was a significantly ($p < 0.05$) higher rate of total nursing hours per patient day (TNHPPD), percentage of RNs with a bachelor's degree, and higher job satisfaction scores, on critical care units in Magnet accredited facilities than those without Magnet status. The results of the Pearson Correlation Matrix are shown in tables 2 and 3 below. None of the hospital-acquired infections studied were found to be correlated with nursing workforce characteristics in either Magnet or non-Magnet hospitals.

Table 1 T-tests of nursing workforce characteristics

Nursing characteristic	Magnet mean estimate	Non-magnet mean estimate	p-value from t-test assuming equal variances	p-value from t-test assuming unequal variances	Conclusion on the difference in the means
TNHPPD	17.614	16.792	0.000	0.000	$p < 0.05$
% BSN	0.531	0.463	0.000	0.000	$p < 0.05$
Job Enjoyment Score	53.436	51.229	0.000	0.000	$p < 0.05$

Table 2 Pearson Correlation Matrix-Magnet

	VAP	CAUTI	CLABSI
TNHPPD	-0.0762	0.1081	-0.2039
% BSN	-0.0377	-0.0972	-0.0679
Job Enjoyment Score	0.1205	-0.1430	0.0377

Table 3 Pearson Correlation Matrix-Non-magnet

	VAP	CAUTI	CLABSI
TNHPPD	0.0391	-0.0392	-0.0511
% BSN	-0.0406	0.1014	-0.0853
Job Enjoyment Score	0.0056	-0.0230	0.0190

DISCUSSION

The Aiken et al study (2000) found that nursing workforce characteristics were significantly higher in ANCC Magnet hospitals than in AAN magnet or non-magnet hospitals. Aiken also found that patient satisfaction and nurse-reported quality of care were higher in ANCC Magnet hospitals. Many studies as discussed in the literature review above have found evidence that nursing workforce characteristics influence patient outcomes. Nursing hours worked, higher educational preparation, and job satisfaction, have all been correlated with lower rates of hospital-acquired infections and higher nurse-reported and patient-reported quality of care. Therefore, it is a logical hypothesis that Magnet hospitals would have lower rates of hospital-acquired infections than non-Magnet hospitals. Analysis of data from NDNQI did not support this assumption.

Contrary to Donabedian conceptual framework, better nursing workforce environments did not result in better patient outcomes in Magnet hospitals. The study did support research from previous studies that nursing work environments are better in Magnet hospitals. Nursing care is a complex process, and a more dynamic model of nursing workforce attributes and patient care processes may be needed to explain the relationships between the working environment, the processes, and patient outcomes. It is possible that it is not a linear relationship as suggested by the Donabedian framework.

This study provided further support to previous research that found better nursing work environments in Magnet hospitals. Due to the nursing shortage, it is important to provide a positive work environment to prevent burnout and reduce costly nurse turnover. Nursing administrators should take this into consideration when making the decision to apply for Magnet accreditation.

Limitations

- NDNQI not a random sample of hospitals, although it is one of the largest databases of its type. Cannot generalize results to all US hospitals.
- Data only from critical care units.
- Did not have nurse and patient opinion of outcomes to compare to previous work. Although we had actual outcomes, some are under-reported and may not reflect true levels of occurrence.

CONCLUSIONS

In summary, this study did not find evidence to support the expectation that Magnet accreditation directly correlates to lower rates of hospital-acquired infections. There was evidence to support existing research indicating that nursing workforce characteristics are better in Magnet hospitals. While Magnet accreditation remains the gold standard for nursing work environments, this status does not automatically lead to better patient outcomes. This study indicates that producing high quality patient care is a complex process. Further work is needed that incorporates nursing care processes, using multivariate modeling to account for patient acuity and other structural measures not included in this analysis. Nursing administrators should look at the data for their unit on individual nursing characteristics that have been shown to affect each type of hospital-acquired infection, and identify ways to improve outcomes from the evidence based practice literature.

REFERENCES

- Aiken, L. & Havens, D. (1999). Shaping systems to promote desired outcomes: The Magnet hospital model. *The Journal of Nursing Administration*, 29(2), 14-20.
- Aiken, L., Havens, D., & Sloane, D. (2000). The Magnet nursing services recognition program: A comparison of two groups of magnet hospitals. *The American Journal of Nursing*, 100(3), 26-36.
- Aiken, I.H., Clarke, S.P., Cheung, R.B., Sloan, D.M., Silber, J.H. (2003). Educational levels of hospital nurses and surgical patient mortality. *Journal of the American Medical Association*, 290(12):1617-1623. doi:10.1001/jama.290.12.1617
- American Hospital Association. (2003). The patient care partnership: Understanding expectations, rights, and responsibilities. Retrieved from the American Hospital Association website: <http://www.aha.org/aha/issues/Communicating-With-Patients/pt-care-partnership.html>
- American Nurses Credentialing Center. (2010). Frequently asked questions about the ANCC's Magnet Recognition Program. Retrieved from: <http://www.nursecredentialing.org/Magnet/Magnet-Program-FAQ.aspx>.
- Centers for Medicare and Medicaid Services. (2008). CMS improves patient safety for Medicare and Medicaid by addressing never events. Retrieved from Center for Medicare and Medicaid Services website: <http://www.cms.gov/apps/media/press/factsheet.asp?Counter=3224&intNumPerPage=10&checkDate=&checkKey=&srchType=1&numDays=3500&srchOpt=0&srchData=&keywordType=All&chkNewsType=6&intPage=&showAll=&pYear=&year=&desc=false&cboOrder=date>
- Hayes, L., O'Brien-Pallas, L., Duffield, C., Shamian, J., Buchan, J., Hughes, F., et al. (2006). Nurse turnover: a literature review. *International Journal of Nursing Studies*, 43, 237-263.
- Hugonnet, S., Harbarth, S., Sax, H., Duncan, R., & Pittet, D. (2004). Nursing resources: a major determinant of nosocomial infection? *Infectious Diseases*, 17(4), 329-333.
- Lankshear, A., SheUion, T., & Maynard, A. (2005) Nurse Staffing and Healthcare Outcomes: A Systematic Review of the International Research Evidence. *Advances in Nursing Science*, 28(2), 163-174.
- National Database of Nursing Quality Indicators. (2010). *Frequently asked questions*. Retrieved from: <https://www.nursingquality.org/FAQPage.aspx>.
- Stone, P., Mooney-Kane, C., Larson, E., Horan, T., Glance, L., Zwanziger, J., et. al. (2007). Nurse Working Conditions and Patient Safety Outcomes. *Medical Care* 45(6), 571-578.
- Whitman, G., Kim, Y., Davidson, L., Wolf, G., Wang, S. (2002). The Impact of Staffing on Patient Outcomes Across Specialty Units. *Journal of Nursing Administration* (32)12, 633-639.